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* General studies, see also individual crops.

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Plant Breeding Abstracts.

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Part I. Empire Section

STATISTICS 519

1. CORNISH, E. A. 519.24
The recovery of inter-block information in quasi-factorial designs with incomplete data. 1—Square, triple, and cubic lattices.
Bull. Coun. Sci. Industr. Res. 1943 : No. 158 : Pp. 22.
Methods for analysing the data provided by square, triple and cubic lattices are discussed and an approximate method for recovering information from incomplete data is described.

2. HERCHENRODER, M. V. M. 519.24
A review of modern practical methods of analysis in statistics.
Rev. Agric. Maurice 1943 : **22** : 51–68.
The application of the "t" and "z" tests is explained and an account given of the "Universal Yield Diagram" method introduced by Wilcox.

3. KRISHNASWAMI AYYANGAR, A. A. 519.24
Statistical formulae.
Curr. Sci. 1943 : **12** : p. 145.
The note gives some fresh computing formulae, namely for the intra-class correlation of a set of families containing unequal numbers of members, and for the variance of the mn variates of the form $ax_j + by_i + cz_{ji}$ $(j = 1, 2, \ldots m; i = 1, 2, \ldots n)$ where a, b, c, are any arbitrary constants. S. N. C.

4. KADAM, B. S. 519.24:631.421(54)
How to conduct yield trials of improved strains of crops in districts.
Poona Agric. Coll. Mag. 1942 : **34** : 117–23.
The author describes suitable methods for setting up yield trials in local farms.

BREEDING 575

5. 575:633(41)
Report (abridged) by the Directors and report by the Director of Research to the annual general meeting 15th July, 1943.
Scott. Soc. Res. Pl. Breed. 1943 : Pp. 33.
This report of the Scottish Society for Research in Plant Breeding contains information about the following crops:—

Oats
The varieties Semi-Dwarf, Elder and Early Miller are being used as parents in hybridization experiments designed to produce new varieties resistant to lodging. An attempt is also being made to breed early and hardy types suitable for upland conditions. Crosses between cultivated varieties and *A. fatua* have been made in order to introduce the character of delayed germination from the latter species. *A. strigosa*, the Bristle-Pointed oat grown along the west coast of Scotland, will not cross with *A. sativa* varieties. In order to produce a better yielding variety tolerant to the alkaline soils on which *A. strigosa* is grown at present, the cross *A. sativa* x *A. byzantina* (the latter species being tolerant to alkaline soils) has been made and selection of the F_2 is now in progress.

Potato
A and B strains of the blight fungus have been differentiated; the latter is the more virulent and all varieties immune to it are also immune to strain A. Resistance to these two strains is controlled by the two dominant genes *Ra* and *Rb*, respectively. Several *S. tuberosum* varieties are resistant to both these strains and also some of the progeny of *S. Rybinii* x *S. demissum*. A third unrecorded virus is reported from the wild species collection at Craigs House. The mode of inheritance of the virus resistant factors *Na*, *Nb*, *Nc* and *Nx* has been further

investigated with special reference to the problem of polyploid inheritance in potatoes; *Nc* is duplex in the variety President. Three types of chlorophyll deficiency exhibiting tetraploid inheritance have been examined, also the genetics of plant tuber coloration.

Brassicae

Purple-top lines of swedes are being developed but an attempt to find lines resistant to finger-and-toe disease has not been successful although slight differences in this respect have been noticed between strains. Interspecific crosses have been made between kale, rape, swedes and turnips but only aborted seed were produced from the cross between marrow-stem kale and rape. Some of the few broccoli plants, of the varieties Royal Oak and St George, that survived the 1940–41 winter are being used in breeding for frost resistance.

6. 575:633(42.23)

General review of research work with lists of papers published during the year.

Ann. Rep. E. Malling Res. Sta. 1942 : (1943) : 14–30.

Apple

Root stocks are being bred for resistance to woolly aphis. Stocks have also been obtained from crosses between "Paradise" apples and some of these may prove superior to the present Malling series. Scions are being bred for late maturity, resistance to woolly aphis and for long season bearing.

Blackcurrant

Several new lines of high yielding blackcurrant have been produced.

Strawberry

Crosses have been made between *Fragaria chiloensis, F. virginiana* and Golden Sovereign. It is hoped that disease resistant lines will be found in the progeny.

Hops

The three strains, R1/55, 401 and CC77, have a P.V. similar to that of Brewer's Gold. The first two have the easy picking quality of Brewer's Favourite and are less susceptible to downy mildew. Many new varieties are being tested and resistance to *Verticillium* wilt is being investigated.

Four recent varieties are recommended to growers. College Cluster (N15 *bis*) is an early mid-season hop with a high P.V.; it has produced an average yield of 21·5 cwt. per acre but although the bine is exceptionally fruitful, its vigour is only moderate. Malling Midseason (BB28) is an early mid-season hop with a high P.V.; its average yield per acre is 18·9 cwt. and it "weighs well". Brewer's Stand-by (HH44) is a mid-season type with a high P.V.; it yields 17·7 cwt. per acre. OH44 is a late hop, also with a good P.V.; it yields 22·2 cwt. per acre and has some resemblance to "Golding Varieties": it is free from American aroma.

7. Grishko, N. 575:633(47)

The biological section of the Ukrainian Academy of Sciences.

Nature, Lond. 1943 : **152** : 404–05.

Fertilization methods for sugar beet and *Taraxacum kok-saghyz* have been elaborated. The sex genetics of hemp has been studied and new sex types have been produced. Work on plant embryology is being pursued and new selection methods for maize are being evolved.

8. Thadani, K. I. 575:633(54)

Annual report of the Department of Agriculture, Sind for the year 1940-41 (up to 30th June, 1941), Karachi 1943 : Pp. 196.

Detailed information about plant breeding work in Sind is presented; the following items may be mentioned:—

Wheat

Breeding for rust resistance and better quality is continuing.

Rice

Promising strains of Silver Jubilee have been selected.

Millet

Some high yielding lines have been obtained from the crosses Acho Kodri x Torh 104–5 and Allakh x Torh 184–5.

Cotton
Extensive selection and hybridization work is in progress in order to obtain superior types well adapted to conditions in Sind. The two crosses, CO 2 x 285 F–1 and CO 2 x Sind Sudhar, have given rise to some promising types.

9. 575:633(54.7)
Annual report of the Department of Agriculture in the Province of Bombay, 1939-40 : 1941 : Pp. 276.
This report contains a large quantity of information relating to breeding programmes in the province of Bombay. The following items may be selected for mention:—

Cotton
A large number of promising crosses have been made including the following: 1A–14–3 x 1–0–1, K.F.T12–2–5 x New Jayawant, K.F.T12–2–5 x 1A–14–3, (K.W.R. x 2519) x Early Jayawant, New Jayawant x B.D.8 back-cross F6–1–6, K.F.T12–2–5 x B.D.8 back-cross F6–1–6, K.F.T12–2–5 x 1A–14–3, (Jarila x N.R.5) x New Million Dollar, and Gadag No. 1 x Co.11.
Breeding for wilt resistance has continued; K.F.T12 and K.F.T14 are homozygous for resistance and the progeny of New Jayawant x K.F.T12–2–5 have been selected for this character.

Rice
Hybrids have been made between Kolumbor and Zinya types and the factors determining purple anthocyanin have been transferred to various varieties in order to facilitate roguing. Improved strains of Dodagya rice have been obtained by selection.

Wheat
The crosses Baxi 33 x 808 and Bansipalli 808 x Polish F5 have been made and promising segregates are being followed.

Gram
Strain No. 8–12 is still proving the most wilt resistant in varietal tests.

10. Arnold, H. C. 575:633(68.9)
Annual report of experiments, season 1941-42. Agricultural Experiment Station, Salisbury.
Rhod. Agric. J. 1943 : **40** : 242–52.

Groundnut
Two newly introduced varieties, Gold Coast and Indian Coromandel, have proved less satisfactory than standard types.

Maize
Several single crosses have been obtained which outyield the standard Hickory King.

Soya beans
Single plant selections have been made from the variety Heron.

Velvet beans
An attempt is being made to replace the varieties Marbilee and Jubilack by more stable forms.

11. 575:633(93.1)
Seventeenth annual report of the Department of Scientific and Industrial Research, New Zealand 1943 : Pp. 44.

Oats
The F_6 of Resistance x Onward has been selected for promising lines. S.17, a selection of Gartons Abundance x Ruakura, is a good forage oat.

Sweet lupin
Single plant selections have been made.

Flax
Breeding for disease resistance is in progress.

Potato
Crosses between commercial varieties and South American species are being developed.

Kale
Selections of marrow-stem kale and thousand-headed kale have been made.

Medicinal plants
Individual plants of *Atropa Belladonna* have been selected for alkaloid content. The Wellington type of *Datura Stramonium* is superior to the English and is also being improved by individual selection.

Rubber plants
Taraxacum kok-saghyz has germinated satisfactorily in New Zealand; selection work is beginning. *Sonchus littoralis* is mentioned as a possible native source of rubber.

Sugar beet
Individual plant selections have been made from the varieties America 3, New Zealand Grown and Schreiber S.S. Polyploid plants have been obtained by the colchicine technique.

Peas
Greencrop, formerly 8/13/2/3, is a new variety of garden pea derived from Greenfeast x Greatcrop. Mammoth Blue (5/7/1/6) and White Prolific (3/42/3) are two new field pea varieties and a third variety, which will probably be named Mammoth White, has been obtained from Victoria x Stratagem.

12. 575:633(94)

Sixteenth annual report of the Council for Scientific and Industrial Research, for the year ended 30th June, Canberra, 1942 : Pp. 74.

Wheat, barley and oats
Varietal tests on newly introduced types are reported.

Maize
Field tests have been made with varieties and hybrids, special attention being paid to ear rot damage.

Forage crops
Several promising strains of Rhodes grass have been selected; a new and vigorous line of ryegrass has been developed at Mossvale; a collection of ecotypes of *Danthonia* has been established at Dickson and attempts are to be made to hybridize these *inter se* and with *D. californica*; and field tests have demonstrated that under certain conditions the Welsh varieties S–26 and S–143 of *Dactylis glomerata* are superior to Australian forms in drought resistance.
Some useful selections of *Trifolium subterraneum* have been obtained from the cross Tallarook x Wenigup, also from crosses between the varieties Tallarook, Bacchus Marsh and Mulwala. Early and late strains have been selected from the ecotype collection of *T. glomeratum*. A collection has also been made of annual *Medicago* species and these have been tested experimentally.

Flax
The two Irish varieties, Stormont Gossamer and Stormont Cirrus, have come out best in field trials.

Linseed
High oil yields have been obtained from the variety Bolley's Golden and from the hybrids of Bison x Rio and Buda x Bison.

Drug plants
Varietal tests have been made with *Papaver somniferum*.

Tobacco
A field experiment designed to determine varietal susceptibility to yellow dwarf virus was inconclusive.

Citrus fruits
Root stock selections have been made.

Potato
Breeding for virus resistance has continued; a number of strains of Australian varieties free from virus X have been discovered. A commercial method of breaking tuber dormancy by treatment with acetylene solution has been devised.

13. PANSE, V. G. 575:633:519.24

Methods in plant breeding.
Indian J. Genet. Pl. Breed. 1942 : **2** : 151–58.

The use of statistical methods in plant breeding is justified in reply to those who regard selection by individual intuition as the most fundamental element of successful breeding.

14. RANGA RAU, D. S. 575:633:581.1
Importance of physiological studies in modern plant breeding.
Poona Agric. Coll. Mag. 1942 : **34** : 123–32.

The importance of physiological studies in plant breeding is discussed with special reference to the following topics: yield, frost resistance, drought resistance, vernalization, photoperiodism, local adaptation, resistance to disease, earliness, floral biology and dormancy.

15. KADAM, B. S. 575.74:633
Deterioration of varieties of crops and the task of the plant breeder.
Indian J. Genet. Pl. Breed. 1942 : **2** : 159–72.

The various cases of crop deterioration are classified and discussed as follows:—

(1) An unfavourable environment may cause a variety to develop poorly and create an impression of deterioration.
(2) Mechanical mixing of seed gives rise to a mixed crop which is then subject to the competitive effect of the contaminant.
(3) Unfavourable mutations are liable to arise and, if left unrogued, will lead eventually to an inferior stock.
(4) Natural hybridization with other varieties, either wild or cultivated, will destroy the purity of a variety.
(5) Most varieties, on release, still contain a considerable reserve of small variations and these may interact in such a way that the less desirable characters are favoured by natural selection.
(6) The continually changing proportions of the physiological races of diseases may lead to the increase of more virulent forms. As a consequence, crop varieties believed to be resistant will become susceptible and give an incorrect impression of genetic deterioration.
(7) Faulty technique on the part of the plant breeder may result in the release of insufficiently stabilized varieties or varieties unadapted to local conditions.

CYTOLOGY 576.3

16. POLLISTER, A. W. and
MIRSKY, A. E. 576.31:581.192:001.4
Terminology of nucleic acids.
Nature, Lond. 1943 : **152** : 692-93.

It is suggested that ribose nucleic acid and desoxyribose nucleic acid should be termed plasmonucleic acid and chromonucleic acid respectively.

17. STEDMAN, E. and 576.312
STEDMAN, E. 576.35:576.312.381
Chromosomin, a protein constituent of chromosomes.
Nature, Lond. 1943 : **152** : 267–69.

The authors present a new hypothesis of nuclear biochemistry. Chromosomin, a protein described here for the first time, is regarded as the principal constituent of the chromosomes, and gives the staining reaction of the latter with basic dyes. Feulgen's reaction is held to indicate the presence of desoxyribose nucleic acid but the stain itself is believed to be absorbed by the chromosomin after its formation from the hydrolytic products of the nucleic acid.
Nucleic acid and histone are regarded as being minor constituents of the nucleus from a quantitative point of view. The following proportions are reported: nucleic acid 26–34%, histone 1·6–16%, and chromosomin 50–72·6%. These findings are discussed with relation to the mechanism of cell division.

18. CALLAN, H. G. 576.312.3
Distribution of nucleic acid in the cell.
Nature, Lond. 1943 : **152** : p. 503.

The author criticizes the theory of Stedman and Stedman (cf. Abst. 17 above), on the distribution of nucleic acid in the cell. Experiments by Mazia and Jaeger, Caspersson, Barigozzi, and Norbert are held to vindicate the theory that desoxyribose nucleic acid is concentrated in the chromosomes.

19. STEDMAN, E. and
STEDMAN, E. 576.312.3
Distribution of nucleic acid in the cell.
Nature, Lond. 1943 : **152** : 503–04.

A reply to Callan's criticism (cf. Abst. 18 above) of the authors' theory on the distribution in the cell of desoxyribose nucleic acid (cf. Abst. 17 above) is presented. Quantitative analysis is held to prove that chromosomin is the principal constituent of the chromosomes. Desoxyribose nucleic acid is believed to be distributed generally in the nuclear sap and also in that part of it which occupies the hollow core enclosed by the spiralized metaphase chromosomes. Whether this core should be regarded as part of the chromosome appears to be a matter of definition. It has been demonstrated that chromosomin will account for the staining qualities of the nucleus and it is suggested that the ultra-violet absorption spectra of chromosomes may be due, not to nucleic acid, but to tryptophane which is an important constituent of chromosomin. Since the authors' analyses of nuclei account for practically the whole of the dry weight, they conclude that nucleic acid is the only substance present in sufficient quantity to make up the solid matter of the nuclear sap. The interpretations suggested by Callan of experiments bearing on the subject are discussed.

20. CHOUDHURI, H. C. 576.312.32:578.65
Chemical nature of chromosomes.
Nature, Lond. 1943 : **152** : p. 475.

Confirmatory evidence is produced in support of the theory of Stedman and Stedman on the mechanism of the Feulgen reaction (cf. Abst. 17 above). It was found possible to stain the chromosomes of pollen mother-cells by applying the dye formed *in vitro* from hydrolysed desoxyribose nucleic acid and Feulgen's reagent.

21. TOBGY, H. A. 576.312.35:576.1
A cytological study of *Crepis fuliginosa, C. neglecta*, and their F_1 hybrid, and its bearing on the mechanism of phylogenetic reduction in chromosome number.
J. Genet. 1943 : **45** : 67–111.

The author presents evidence from a cytological study of the hybrid *Crepis fuliginosa* x *C. neglecta* to support the theory that reduction in chromosome number during phylogeny may occur through reciprocal translocation. It is further assumed that such translocations may produce genetically inert chromosomes which are ultimately eliminated without disturbing the life processes of the plant.

22. CATCHESIDE, D. G. and
LEA, D. E. 576.356:537.531:581.331.2
The effect of ionization distribution on chromosome breakage by X-rays.
J. Genet. 1943 : **45** : 186–96.

The coefficient of chromatid breakage increases with X-ray wave length over the range $\lambda = 0{\cdot}15$Å to $\lambda = 4{\cdot}1$Å. This result is interpreted to mean that only the densely ionizing "tails" of the electron tracks are effective in chromosome breakage. The probability of interchange is reduced in the long cylindrical nucleus of the pollen tube owing to the different type of chromosome packing

BOTANY 58

23. LEWIS, D. 581.162.5:576.356.5:581.036
Physiology of incompatibility in plants. III. Autopolyploids.
J. Genet. 1943 : **45** : 171–85.

In all species so far investigated, autopolyploidy results in a weakening of the incompatibility mechanisms of the plant. This finding is discussed with reference to gene interaction and the theory of antigen and antibody formation. Temperature influences compatible and incompatible pollen tubes to different degrees.

It is suggested that natural selection would eliminate all but self-compatible or vegetatively reproducing autotetraploids. The degree of sterility that would result from incompatible forms would be very high.

24. KOLLER, P. C. 581.331.2:537.531
The effects of radiation on pollen grain development, differentiation, and germination.
Proc. Roy. Soc. Edinb. 1943 : **61** : Sect. B : 398–428.
A detailed analysis of the effects of X-rays on the development of *Tradescantia* pollen grains is presented. Chromosome stickiness is attributed to an excessive deposit of "non-polymerized nucleic acid". Normal germination takes place only when (*a*) the generative nucleus is fully differentiated, (*b*) the vegetative nucleus is of normal size, and (*c*) when supernumerary or lightly staining micronuclei are absent.

25. HUTTON, E. M. 581.48:578.08:635.64
578.08:581.48:635.63
A new method for tomato and cucumber seed extraction.
J. Coun. Sci. Industr. Res. Aust. 1943 : **16** : 97–103.
A method for recovering tomato and cucumber seed by an acid extraction technique is described.

26. WILLIAMS, C. B. 581.9:576.16
Area and number of species.
Nature, Lond. 1943 : **152** : 264–67.
It is suggested that the relation between the number of species (S) and the number of individuals (N) in random samples of a mixed population is given by

$$S = \alpha \log_e \left(1 + \frac{N}{\alpha}\right),$$

where α represents a constant for the population under consideration. The author then proceeds to analyse the relationship between number of species per unit area and size of area for the flora of the whole world.

AGRICULTURE 63

27. 63(4)
Co-operative systems in European agriculture.
Advance. Sci. Lond. 1943 : **2** : 356–59.
A report is presented of the conference held on 16–17 April on the place of co-operative systems in European agriculture.

PLANT DISEASES AND PESTS 632

28. WHITE, N. H. and
MCINTYRE, G. A. 632.421.9–1.521.6:576.16:633.11
The pathogenicity of single spore isolates of *Ophiobolus graminis* under field conditions.
J. Coun. Sci. Industr. Res. Aust. 1943 : **16** : 93–94.
Monosporial cultures derived from each of the 8 ascopores from an ascus of *Ophiobolus graminis* showed significant differences in their pathogenicity which depended also on the type of inoculum used.

29. JOHNSON, T. and
NEWTON, M. 632.452:575.11:633.11
The inheritance of a mutant character in *Puccinia graminis Tritici*.
Canad. J. Res. 1943 : **21** : Sect. C : 205–10.
The inheritance of a variant of *P. graminis Tritici* race 21, which produces 50% white spermagonia and 50% normal spermagonia is described. Crosses between the white spermagonia are sterile while crosses between the normal spermagonia produce the normal rust. Aecidiospores were obtained from crossing normal and white spermagonia and the resultant line produced 50% white spermagonia when re-inoculated. It is concluded that white spermagonia are determined by a single factor, lethal in the homozygous condition; segregation occurs in the basidium and produces equal numbers of the two types of basidiospore. The factor is not limited to race 21 and has been transferred by hybridization to races 11, 17 and 48; no close linkage with the sex factor was observed.

30. NOBLES, M. K. 632.472.3:582(71)
A contribution toward a clarification of the *Trametes serialis* complex.
Canad. J. Res. **1943** : **21** : Sect. C. : 211–34.
Cultural and interfertility studies on fungi of the *Trametes serialis* complex, which attack coniferous wood, have resolved the complex into the following species: *Trametes serialis* Fr., *Poria microspora* Overhalts, n.sp., *P. carbonica* Overhalts, n.sp., *P. Sequoiae* Bonar and *Polyporus palustris* Berk. Diagnostic characters for these species are given.

31. NORRIS, D. O. 632.8–1.521.6:576.16:635.64(94)
Strains of spotted wilt virus and the identity of tomato tip-blight virus with spotted wilt.
J. Coun. Sci. Industr. Res. Aust. **1943** : **16** : 91–92.
The spotted wilt virus of tobacco has been resolved into three strains; differences in the proportions of these explain the well known variation in the severity of the disease.

32. 632.951.1:575.42(54.8)
What the scientists are doing. Pyrethrum in Mysore.
Indian Fmg **1942** : **3** : 441–42.
Pyrethrum is being selected for yield and adaptability to conditions in Mysore.

WHEAT 633.11

33. THOMAS, I. and 633.11:575(94.1)
MILLINGTON, A. J. 633.13:575(94.1)
Wheat and oat variety trials, 1942.
J. Dep. Agric. W. Aust. **1943** : **20** : 91–96.
Field trials of wheat varieties are reported. Kondut is a new variety approaching Bencubbin in yield but with much stronger straw. Koorda is an early maturing counterpart of Kondut. Ballidu is a new variety of oat, superior to Mulga in straw strength and grain-holding capacity. Dale is a new late mid-season variety having stronger straw than Guyra.

34. MCKEON, B. F. 633.11:575.12(94.5)
Wheat varieties in the Wimmera.
J. Dep. Agric. Vict. **1943** : **41** : 243–45.
The progeny of the following crosses are showing promise for adoption in the Wimmera: Ghurka x C.M.G. 5537, Ghurka x White Fife, Wannon x Ghurka, Ghurka x Ranee and Pindar Selection. Varietal tests with these and other types are reported.

35. KNOWLES, P. F. and
HARRINGTON, J. B. 633.11:581.46:575.127.2
Breeding smooth-awned *durum* and *vulgare* wheats.
Sci. Agric. **1943** : **23** : 697–707.
Two lines of awnless *T. durum*, I 35–1 and I–35–4, have been crossed with Mindum and the progeny selected for awnlessness and straw strength. The results obtained suggest that several genes determine the awnless condition and the operation of a major, a minor and auxiliary modifying genes is postulated.
Line I–35–1 has also been crossed with the following varieties of *T. vulgare*: Reward, Apex, Thatcher, Marquis and A277, and line I–35–4 with Garnet, Reward, Apex and Thatcher. These crosses were made in 1936, and in 1939, the F_3 progenies included no smooth-awned *vulgare* types although some approaches to this condition were found. These lines were continued until 1942 when, in the F_6, one line of I–35–1 x A277 and one from I–35–1 x Apex were found to combine *vulgare* habit with smooth awns. The authors emphasize the desirability of using large populations in breeding work of this description.

36. IBRAHIM SHAH, M. 633.11–2.112–1.521.6:575.12(54.2)
Better variety of wheat for the unirrigated lands in the Province.
Quart. Notes Agric. Dep. N.W.F. Prov. **1941** : **3** : No. **3** : 5–7.
"Russian Rye" is being crossed with 8A wheat in the hope of producing a drought resistant wheat suitable for the North West Frontier Province.

37. PUGSLEY, A. T. 633.11–2.451.2:576.16:631.521.6
Varietal resistance of wheat to loose smut.
J. Aust. Inst. Agric. Sci. **1943** : **9** : 86–88.
Varietal resistance of wheat to loose smut has been investigated. Some evidence of intra-varietal genetic variability was discovered.

BARLEY 633.16

38. HUNTER, H. 633.16:581.6(41)
Malting barley and how to grow it.
Red Cross Agric. Fund Leafl. **1942** : Pp. 8.
This pamphlet includes a short account of barley varieties from the point of view of malting quality. Spratt-Archer and Plumage-Archer are recommended.

39. 633.16–2.111–1.521.6:575.12(42.59)
Pioneer winter barley.
Leafl. Nat. Inst. Agric. Bot. **1943** : Pp. 2.
Pioneer, a new variety of winter barley, is being released. It is a selection from Tschermak's two-row winter barley x Spratt-Archer, and combines winter hardiness with many of the good characters of Spratt-Archer.

RICE 633.18

40. 633.18:575.12(88)
Report of the Department of Agriculture, British Guiana, for the year 1942 : Pp. 10.
Rice hybrids have been obtained which produce higher yields than D.110.

41. VENKATA SUBRAMANIAN, M. K. 633.18:578:08:581.331.2
Artificial germination of rice pollen.
Curr. Sci. **1943** : **12** : 208–09.
It has been found possible to obtain 50–60% germination of rice pollen by dusting the pollen over a slide and placing it in a desiccator at 28–29° C. with an internal humidity of 100%.

FORAGE GRASSES 633.2

42. 633.22:575.42(93.1)
Cocksfoot seed production.
Agric. Bull. Canterbury Chamb. Comm. **1941** : No. **142** : Pp. 4.
College Cocksfoot (C23) is a selection from Akaroa, the standard New Zealand variety of cocksfoot. The new strain has finer leaves and denser crowns than its parent.

43. 633.263:575(93.1)
Annual report of the Department of Agriculture, New Zealand for 1941-42 (1942) : Pp. 12.
This report includes a reference to rye grass, new strains of which have been produced.

44. KNOWLES, R. P. and
HORNER, W. H. 633.289:581.162.5:578.08:575.12
Methods of selfing and crossing crested wheat grass, *Agropyron cristatum* (L.) Beauv.
Sci. Agric. **1943** : **23** : 598–611.
An average seed set of less than 0·10% is obtained from selfing *Agropyron cristatum* under Kraft or glassine paper bags. A higher figure is obtained if cotton cages are used but this may be due to contamination. Hand emasculation is difficult but a satisfactory result was obtained by hot water treatment at 48° C. for 1 minute. The set obtained from cross-pollination ranged from 5·72–16·54%. The lines of common *A. cristatum* obtained by breeding have not, so far, proved superior to the variety Fairway.

LEGUMINOUS FORAGE PLANTS 633.3

45. ANDREWS, W. D. 633.32–1.524(94)
Pasture investigations—results of 1942 trials.
J. Dep. Agric. Vict. **1943** : **41** : 277–85.
Varietal tests with subterranean clover have demonstrated the inadvisability of replacing local forms by introduced strains. It is possible, however, that a judicious combination of local and introduced types might lengthen the grazing season of the pasture concerned.

46. GATES, R. R. 633.491:576.356.5
Polyploidy in the potato.
Nature, Lond. 1943 : **152** : 416–17.
The problem of the polyploid nature of the potato is briefly reviewed.

47. PAL, B. P. 633.491:581.143.26.035.1:578.08
A controlled-illumination chamber for maintaining short day species of potatoes.
Indian J. Genet. Pl. Breed. 1942 : **2** : p. 183.
A description is given of a controlled-illumination chamber, suitable for rearing short day plants.

48. BURNHAM, J. C. and MACLEOD, D. J. 633.491–2.7–1.521.6
Varietal susceptibility of potatoes to aphid injury.
Canad. Ent. 1942 : **74** : No. **2** : p. 36.
It has been observed that potato varieties differ in their degree of foliar resistance to aphid attack.

FIBRES 633.5

49. — 633.51:575(54)
Indian Central Cotton Committee. Annual report for the season 1941–42 : Pp. 103.
The results of the investigations on cotton genetics carried out at the Institute of Plant Industry, Indore, have been noted elsewhere (cf. Abst. 50 below), the work of the other research stations is reported below:—

Broach
A number of new selections have been tested in the field against local varieties. Segregates 1–2, 1–6 and S–18 have been crossed with 1027 A.L.F. in order to improve fibre length and feel. A study of the F_3 of K.F. x 1027 A.L.F. has confirmed the theory that wilt resistance in *G. herbaceum* is due to a single factor.

Jalgaon
The progeny of the following three crosses are under observation: (Jarila x N.R.5) x New Million Dollar, Jarila x N.R.5, and (Jarila x New Million Dollar) x Jarila. One desirable line was obtained from the first cross.

Surat
Hybridization for wilt resistance is in progress; the following crosses having been made: (B.D.8 x 1 A.L.B.) x 1027 A.L.F., 8–1 x B.D.8, 8–1 (B.D.8 x G.A.26) x B.D.8, 1027 (B.D.8 x G.A. 26) x B.D.8, and 8–1 x 1027 A.L.F. Only the last three crosses have produced promising families.
Fertile hybrids between American and Asiatic cottons have been obtained by back-crossing the F_1 hybrids to the American parents; most of these forms had 52 chromosomes. Some success has been obtained in reducing hybrid sterility by means of the colchicine technique.

Viramgam
Field trials of the progeny from crosses between Wagad cotton and Indian, Iranian and Russian strains have been made. There does not appear to be much further scope for improving the standard strain, Wagad 8, but segregate 4–1, derived from (W.8 x 1027 A.L.F.) x W.8, gives higher yields and has a 5·6% higher ginning percentage. Segregate 7–1, from W.8 x 1027 A.L.F. is superior to Chokadia Broach 9 and Broach local with respect to lint yield and ginning percentage.

Kaira
An analysis of the local Kanmi variety has demonstrated that it is a mixture of Broach Desi and Goghari. Efforts are being made to find a variety able to replace Rozi cotton.

Sind
Sind Sudhar and M 2 have been crossed with Upland varieties introduced from the U.S.A.; it is hoped by this means to obtain an increase in staple length. Field trials for jassid resistance have also been made, S.L.D.1 being highly resistant.

Punjab
Some high ginning selections have been made from 289F/43, and some jassid resistant types have segregated from 289F/K.25 x 289F/43. Two new American types, 124F and 199F, are showing promise. The following hybrids have been made in the hope of obtaining jassid resistant strains: [4F (Sakrand) x 124F] x 4F, (920 Cambodia x 58F) x 124F, (920 Cambodia x 58F) x 289F/43, 124F x L.S.S., 124F x 289F/K.25, and Co.2 Sind Sudhar.

Central Provinces and Berar
New selections have been tested against the standard local varieties.

Madras
Selection for resistance to cotton stem weevil (*Pempherulus affinis*) has continued. Efforts are being made to introduce new varieties capable of replacing Mungari cotton.

United Provinces
Strain D from survey material has given consistently high yields.

Bengal
Ecotypes of *G. cernuum* and *G. neglectum* are being examined in the hope of discovering coarse, high ginning strains suitable for mixing with wool.

Hyderabad
The most outstanding improved strain derived from local varieties is Gaorani 6. Breeding for wilt resistance is also in progress.

Baroda
Strains of karkhadi cotton have been selected for resistance to root rot and the F_2 generations of Jarila x S.5 and Jarila x S.6 have been selected for quality.

Bikaner
The following crosses have been made: Shan x Mollisoni, Bani x C.520, Shan x C.520, and Rajputana x Mollisoni. None of the progeny came up to C.520 in ginning percentage.

Mysore
Breeding for resistance to "red leaf" disease is in progress and promising lines have appeared in the progeny of crosses of M.A.II and Co.2 with *G. purpurascens*.

50. 633.51:575.061.6(54.3)
633.51:537.531:575.113
633.51:575.127.2

Progress report of the Cotton Genetics Research Scheme, Indore, for 1941-42 : Pp. 31.

The genetical relationships of the various genes determining lintless seeds have been investigated. A cross between 1027 lintless (*lia*) and Wagad lintless (*lib*) segregated normal, *lia* types, *lib* types and double recessives in the F_2, the proportions being 9:3:3:1 respectively; the double recessives had small shrivelled seeds. Punjab hairy lintless (*lic*) was also crossed with 1027 lintless (*lia*) and the F_2 comprised F_1, *lic* and normal phenotypes in the ratio of 35:16:13. It is concluded that *lia* and *lic* are distinct genes with *lic* epistatic to *lia*; a modifying gene is postulated to determine lint production in the presence of either *Lia* or *Lic*. No linkage could be found between *lia* and either petal colour (*Y*) or anthocyanin (R_2) genes.
A satisfactory explanation of the F_2 segregation of Wagad lintless (*lib*) x Punjab hairy lintless (*lic*) has not yet been devised; F_1, *lic* and normal phenotypes were produced. Crosses between Wagad lintless (*lib*) and *G. arboreum* varieties segregated either in 3:1 or 13:3 ratios; the difference between these two modes of segregation is attributed to modifying genes. Neither anthocyanin, flower colour or leaf shape genes exhibited linkage with *lib*.
Nandyal lintless appears to be another gene determining lintless seeds. Its phenotype differs from *ha*, *hb* and *lic* and it can be distinguished from *lib* by its breeding behaviour when crossed with Narrow Kokati. As a result of crossing Punjab hairy lintless (*lic*) and Punjab glabrous lintless (*hb*), an F_2 was obtained containing hairy linted, F_1 hairy lintless, *lic* hairy lintless and glabrous lintless types in the ratio of 3:6:3:4; it is concluded that *lic* and *hb* are distinct genes.
An X-ray induced mutant, determining "dilute petal spot" was produced in the variety Banilla and on crossing the homozygote with normal plants, a monohybrid segregation was obtained; the mutant is almost completely dominant. The gene R_2^{as} has been shown to be different from gene R_2^{os}; the latter being distinguished from the former by the anther pigmentation of its phenotype.

Allelic intermutation is reported for the R_2 series, the following changes having been observed: R_2^{OS} to R_2^{AS}, R_2^{GS} to R_2^{AS}, and R_2^{WO} to "green spotless". The latter gene is not the "green spotless" gene (R_2^{FO}) of Silow which induces pigmentation along the exposed petal margins. The breeding behaviour of a single leaf mutant was difficult to interpret; it gave neither a monohybrid ratio when crossed with normal plants nor a dihybrid ratio when crossed with other leaf mutants.

A gene determining "pale yellow petal" (Y^Pb) occurring in a Chinese introduction is different from the Banilla pale yellow gene (Y^Pa). It is complementary, however, to Banilla pale yellow or white, in combination with which it gives rise to a "yellow" pigmentation.

It has also been found that a single recessive factor determines "virescent yellow" seedlings. The gene concerned, moreover, is independent of the anthocyanin (R_2) genes. A petalody mutant was investigated and found to be unlinked either to anthocyanin or petal colour genes; the degree of dominance of the normal to the petalody mutant depended on the genetical background of the cross.

Fuzz inheritance is apparently more complex than generally supposed. The ratios of F_2 progeny types and the discovery that lines of intermediate fuzziness breed true to this character suggests that several genes are probably involved.

X-ray treatment of the variety M.U.4 induced a definite increase in ginning percentage; when, however, allowance was made for selection bias, this increase became less significant.

The genetics of wilt resistance has been studied in the varieties New Million Dollar and Jarila. Seed has been obtained from the following interspecific hybrids: *G. Thurberi* x *G. arboreum*, *G. Thurberi* x *G. hirsutum*, *G. Raimondii* x *G. arboreum*, *G. Raimondii* x *G. hirsutum*, *G. Harknessii* x *G. hirsutum*, and 4*n* (*G. arboreum* x *G. anomalum*) x *G. hirsutum*. Bolls have set in colchicine treated plants of *G. Taitense* x *G. hirsutum* and *G. Armourianum* x *G. hirsutum*. Heterosis has been observed in *G. arboreum* crosses.

Statistical analysis has shown that little further improvement of ginning percentage or halo length is to be expected by continuous selection. The relative efficiencies of various sampling patterns have been investigated.

633.51:575.061.6(54.3)
51. 633.51:537.531
633.51-2.484-1.521.6:575.12

Progress report of the Cotton Genetics Research Scheme, Indore, 1942-43 : Pp. 20.

A few instances of simple dominance of naked seeds to fuzzy have been observed but, in general, the progeny of crosses between these two types show continuous segregation for this character, several of the intermediate grades breeding true. It is assumed that fuzziness is determined by multiple factors. Crosses between 5-locular and 3-locular bolls have demonstrated that the former are simply recessive to the latter; 4-locular bolls occur occasionally in both these types. An analysis of the progeny of crosses between single leaf mutant and normal strains has confirmed the assumption that only 30% of the mutant gametes are functional.

The character "red leaf" which exhibits a practically uniform red pigmentation on the upper leaf surface must be distinguished from "patchy red leaf" which is probably caused by jassid infection. "Red leaf" is determined genetically and when crossed with normal types gives an F_2 segregation of red, intermediate and normal green forms in a ratio of 1 : 2 : 1. There is evidence that certain environmental factors may partially suppress the expression of this feature; it is associated with earliness and is not, on the whole, correlated with any disadvantageous character.

It has been shown that "green spotless" (R_2^{WO}) is the basic recessive allele of the R_2 series. It segregates according to a 3 : 1 ratio when crossed with R_2^{OS}. The latter gene differs from the anthocyanin gene of tellapathi which determines pigmentation in the anthers. R_2^{OS} is dominant to the tellapathi gene in respect of anthocyanin characters.

A single plant of Upland cotton, whose seed had received a 20 minutes X-ray treatment, behaved outstandingly in progeny trials; it was superior to M.V.4 in yield, ginning percentage and lint length.

Wilt resistance is still receiving much attention. A resistant strain of Malvi is not yet homozygous and several wilt-resistant families have been found among the progeny of the following

crosses: M^1 x Jarila, M-9-20 x Jarila and Million Dollar x Jarila. *G. anomalum* is very susceptible to wilt and this defect was conveyed to all the progeny of the cross 4*n* (*G. anomalum* x K^9) x *G. hirsutum*.
Crosses between Bengal strains and varieties of *G. arboreum* exhibited heterosis for several quality characters. The correlation between earliness and various morphological features has been investigated and a statistical analysis made of the various components of yield. Regression coefficients were calculated between the number of bolls per plant, the number of seeds per boll, the weight of cotton per seed and the ginning percentage. It was concluded that the most important character to select is the weight of cotton per seed.

52. GANESAN, D. 633.51:575.125
Hybrid vigour in cotton. I. The manifestation of hybrid vigour in the seed.
Indian J. Genet. Pl. Breed. 1942 : **2** : 134–50.
The manifestation of hybrid vigour has been examined in intraspecific hybrids of *Gossypium arboreum* var. *neglectum*. It is necessary to eliminate environmental and maternal influences and this is possible by means of suitable field methods and the use of reciprocal crosses.
It is concluded that "seed weight by itself gives ample evidence of the manifestation of hybrid vigour in the seed, and is a good index in forecasting hybrid vigour in the post-germination period". The author discusses his results in the light of the concept of "initial advantage" which he extends to cover a more general range of observations.

53. RAMIAH, K. and KAIWAR, S. R. 633.51:575.172.3:581.6
Studies on the Punjab hairy lintless cotton mutant.
Indian J. Genet. Pl. Breed. 1942 : **2** : 98–110.
The multiple effects of the gene pair *Lic, lic* have been investigated with reference to the following characters: total height, internodal length, number of nodes, growth rate, development of the testa, leaf shape, boll and seed characters and seed viability. It is concluded that the mode of action of the genes considered is a genuine case of pleiotropism.

54. KHAN, M. A. 633.51–2.7–1.521.6:575.12(54.5)
What's doing in all-India. The Punjab.
Indian Fmg 1943 : **4** : 99–101.
A breeding programme is in progress in the Punjab to produce jassid resistant cotton varieties. Existing Punjab-American varieties have been crossed with Tanguis cotton from Africa and Cambodia cotton from Madras. The progeny of the former cross have deteriorated but the latter have maintained resistance and produced several satisfactory types.

55. 633.523:575.061.6
Progress of technical schemes.
Bull. Indian Cent. Jute Cttee 1943 : **6** : 138–39.
Two principal genes and one modifier are responsible for the anthocyanin patterns of the jute species *Corchorus capsularis*.

56. GHOSE, R. L. M. 633.523:575.116.1:581.48
The genetics of (*Corchorus*) jute. The inheritance of pod shape and its linkage relationship.
Indian J. Genet. Pl. Breed. 1942 : **2** : 128–33.
The inheritance of pod shape in *C. capsularis* is explicable on a unifactorial basis. An 8·0% crossing-over value was found between this factor and the anthocyanin genes.

57. 633.523:581.162.32
Progress of technical schemes.
Bull. Indian Cent. Jute Cttee 1943 : **6** : 226–27.
Natural cross-pollination in fields of *Corchorus olitorius* was found to occur in 0–33% of the cases examined. The average value was 12·9%.

58. DESHPANDE, R. B. 633.524.35:575.113
Inheritance of leaf-lobe in *Hibiscus cannabinus* L.
Indian J. Genet. Pl. Breed. 1942 : **2** : 181–82.
Lobed leaves are dominant to entire in *H. cannabinus*; inheritance of this character is unifactorial.

59. Allan, H. H. and Cranwell, L. M. 633.526.41:581.142:575.11
Vivipary in *Phormium*.
Rec. Auck. Inst. Mus. 1942 : **2** : No. 6 : 269–79.
The production of viviparous seedlings in the species *P. tenax* and *P. Colensoi* is described. The authors have investigated also the inheritance of vivapary and conclude that although the effect of the environment is significant, genetical determination is the more important.

SUGAR PLANTS 633.6

60. Walawalkar, D. G. 633.61:575(54)
Improved sugarcane varieties in India.
Indian Fmg 1942 : **3** : 425–27.
A general account is given of the work of the Coimbatore Sugarcane Research Station in producing new sugar cane varieties.

61. 633.61:575.12
633.61–2–1.521.6:581.6
Resumé of the twelfth annual report of the sugarcane research station, 1941.
Rev. Agric. Maurice 1943 : **22** : 22–26.
More than 650 seedlings have been obtained from crosses between B.H.10(12) and local varieties, and hybridization involving lines of *Saccharum spontaneum* and *S. Barberi* has been effected.
A close correlation between an unknown substance related to tyrosine and the resistance or susceptibility of sugar canes towards *Colletotrichum falcatum* has been established The relation between lignin content and susceptibility to cane borers has also been investigated.

62. Chatterji, S. N. 633.61:582(54.1)
Sugarcane in Bengal.
Indian Fmg 1943 : **4** : 132–33.
A historical survey is given of the sugar cane varieties grown in Bengal.

STIMULANTS 633.7

63. Ramanujam, S. and Joshi, A. B. 633.71:576.354.4:575.127.2
Interspecific hybridization in *Nicotiana*. A cytogenetical study of the hybrid *N. glauca* Grah. x *N. plumbaginifolia* Viv.
Indian J. Genet. Pl. Breed. 1942 : **2** : 80–97.
Nicotiana glauca ($2n = 24$) has been crossed with *N. plumbaginifolia* ($2n = 20$) and viable hybrids obtained; more offspring were produced when *N. glauca* was the female parent. The F_1 plants ($2n = 22$) were self-sterile and produced mainly univalents at meiosis I although as many as three bivalents were observed in some cases. It was noticed that chromosomes of unequal length sometimes associated together to form the bivalents. Meiosis is extremely irregular but some restitution nuclei were formed after anaphase I and these gave rise eventually to dyad gametes with 22 chromosomes.
No seed was formed from back-crossing the hybrid to *N. plumbaginifolia* but plants were reared from the backcross with *N. glauca*. The F_2 plants differed amongst themselves in morphological characters; most of them were "triploid" ($2n = 34$) with one chromosome set from *N. plumbaginifolia* and two from *N. glauca*; one plant had only 32 chromosomes.
The 34-chromosome hybrids usually produced a meiotic configuration of $12_{II} + 10_{I}$ but up to 14 univalents were found. No trivalents were observed and restitution nuclei only occasionally. Several meiotic aberrations are described.
A successful cross, [(*N. glauca* x *N. plumbaginifolia*) x *N. glauca*] x *N. plumbaginifolia*, was obtained by backcrossing the "triploid". It is hoped that some of the offspring will be amphidiploids.
Seed was not set from the 32-chromosome plant which exhibited a meiotic configuration of $11_{II} + 10_{I}$, nor have any polyploids been demonstrated yet from the use of the colchicine technique.

64. 633.71–2.6–1.521.6:575.12
Eelworm resistance.
Rhod. Agric. J. 1943 : **40** : p. 213.
Several American varieties of *Nicotiana* spp., claimed to be resistant to eelworm, have been grown in infected soil. From the results of this experiment, it appears that the resistance should be considered not as actual immunity but as tolerance. Crosses have been made between these varieties and Bonanga and Turkish.

65. Eden, T. 633.72:578.08:575.42
The selection of high-yielding tea bushes for vegetative propagation.
Tea Quart. 1941 : **14** : 98–102.
The author recommends the use of flush counts in selecting tea bushes for yield.

66. 633.72–2.8–1.521.6
Sixteenth annual report of the Board of the Tea Research Institute of Ceylon for 1941.
Bull. Tea Res. Inst. Ceylon 1941 : No. 23 : Pp. 81.
Evidence is being accumulated to support the hypothesis that phloem necrosis is a virus disease. It has been transferred by graft to several low jat scions, but up to present all high jat scions have remained healthy.

67. 633.73.00.14(67.8)
Ninth annual report of the Coffee Research and Experiment Station, Lyamungu, Moshi 1942.
Dep. Agric., Tanganyika 1943 : Pp. 9.
Varietal tests on a number of coffee selections are reported.

68. Posnette, A. F. 633.74:575(72.98)
Cacao selection on the Gold Coast.
Trop. Agriculture, Trin. 1943 : **20** : 149–55.
The predominant cacao type in West Africa is the Amelonado which must be distinguished from some of the segregates of the Trinitario complex which have similarly shaped pods. It is probable that the Amelonado variety was derived from Surinam and it is genetically very uniform. Almost all the plants of this type are high yielding and self-compatible.
Selection, as a means of improving the variety, is difficult owing to its high degree of uniformity but it is suggested that the number of pods per tree is the best criterion for breeding.
Some of the Trinitario hybrids exceed the Amelonado variety both in vegetative vigour and in disease resistance. Since there is considerable genetical variation within this complex, selection would probably produce valuable lines.
Methods of selection in the experimental stations and on native farms are described.

69. Baker, R. E. D. 633.74–2.472.3–1.521.6
Witches' broom disease investigations. IV. Further notes on the susceptibility of I.C. selections at River Estate to witches' broom disease of cacao.
Trop. Agriculture, Trin. 1943 : **20** : 156–58.
The results of an examination of I.C. selections of cacao for witches' broom susceptibility are reported.

70. Callan, E. McC. 633.74–2.7–1.521.6:575.42
Thrips resistance in cacao.
Trop. Agriculture, Trin. 1943 : **20** : 127–35.
Methods for selecting cacao for thrips resistance are described. It has been found that freedom from defoliation is not a satisfactory criterion but that population counts confirmed by laboratory feeding tests are much more satisfactory. The selection RT 18 combines a high degree of resistance with good commercial quality. Reasons for thrips resistance are not fully understood although it is thought probable that resistance of the leaves to puncturing is most important.

71. Salmon, E. S.,
Beard, F. H. and
Hatton, R. G. 633.79:576.16
The merits of the new varieties of hops.
Ann. Rep. E. Malling Res. Sta. 1942 (1943) : 108–12.

This paper has already been reviewed from another source (cf. "Plant Breeding Abstracts", Vol. XIII, Abst. 711).

72. Beard, F. H. 633.79:576.16:582
Commercial varieties of hops: a preliminary comparison of their chief characteristics at East Malling.
Ann. Rep. E. Malling Res. Sta. 1942 (1943) : 75–83.

An investigation into the systematic relationship between the commonly grown hop varieties is presented. They are all members of the species *Humulus Lupulus* and may be classified into three groups, the first of which includes the types with green bine. Colgate is included in this category and the original plant is reputed to have been found growing wild near Chevening in the early nineteenth century. Fuggle is another green bine variety and is derived from a chance seedling discovered at Horsmonden in 1861. No significant difference could be detected between different strains of Fuggles nor between these and Guilton Golding.
The second group includes red bine forms and is represented by Tolhurst, a variety with inferior commercial quality.
A large number of varieties are included in the third group of mottle bine varieties. No obvious morphological criteria separate the various Golding forms from each other but statistical analysis reveals several significant differences. The original Golding variety is supposed to have been raised by selection from the "Canterbury Hop" at the end of the eighteenth century and it seems probable that the different forms of this variety arose as bud sports from the original type. The "Golding Varieties", Cobbs and Tutsham, are also mottle bine forms.

OIL PLANTS 633.85

73. Mohammad, A.,
Sikka, S. M. and
Aziz, M. A. 633.853.49:575.116.1.061.6:581.47
Inheritance of seed colour in some oleiferous *Brassicae*.
Indian J. Genet. Pl. Breed. 1942 : **2** : 112–27.

The authors propose a trifactorial scheme to explain the mode of inheritance of seed colour in oleiferous *Brassicae*. Four phenotypes are recognized and the genetic constitutions of the homozygotes are assigned as follows: (1) dark reddish-brown, $Br_1Br_1br_2br_2Br_3Br_3$ or $Br_1Br_1br_2br_2br_3br_3$; (2) reddish-brown, $br_1br_1Br_2Br_2Br_3Br_3$ or $br_1br_1Br_2Br_2br_3br_3$; (3) yellowish brown, $br_1br_1br_2br_2Br_3Br_3$; and (4) yellow, $br_1br_1br_2br_2br_3br_3$. None of these genes are linked to the factors determining leaf hairiness, flower colour, or number of valves per pod. It is concluded that the genes Br_1, Br_2, Br_3 form a polymeric series, thus supporting the theory that the species under consideration are allopolyploids.

74. Vachhani, M. V. and
Deshpande, R. B. 633.854.54:575.242:575.113
A case of partial dialysis of carpels in linseed.
Indian J. Genet. Pl. Breed. 1942 : **2** : 178–80.

A teratological mutant determining dissociation of the upper parts of the gynoecium has been observed in linseed. It is believed that it arose as a somatic mutation; it is inherited as a unifactorial recessive.

75. 633.854.56:575.12(68.9)
Report of the Department of Agriculture, Nyasaland Protectorate, for the year 1942 : Pp. 16.

Hybridization and selfing of high yielding tung trees has been commenced at Chieawanu.

76. TOOVEY, F. W. and CAMPBELL, G. K. G. 633.855.34:581.162.5:519.24(66.9)
Second annual report of the Oil Palm Research Station, Nigeria for 1940/41. Part B.—Selection, breeding and other botanical investigations. Pp. 8.

Statistical analysis of the yield data of the thin-shelled palm plantation at the main station is proving difficult since the coefficient of variability of the population is of the order of 80%; this is due mainly to the differences in the degree of self-sterility shown by the strains utilized. C.A.256, the best thick shelled parent from Calabar, is being multiplied as a standard.

77. SHEFFIELD, A. F. W. 633.855.34:581.162.5:575(66.9)
First annual report of the Oil Palm Research Station for 1939/40. Nigeria : Part A : Pp. 8; Part B : Pp. 13.

A new research station has been established at Ekiadolar where 40 acres of land have been planted with the following palm strains: UZ707, UZ864, UZ931 (thin shelled varieties) and UZ731 and UZ832 (thick shelled varieties). It is hoped that this plantation will provide useful material for uniformity data and the study of self-pollination and crossing. Additional plantings have been made at Ibadan, Umuahia and Nkwele.
At Aba, material has been selected for yield and the genetics of thick and thin shell inheritance is being investigated.
It has been decided that only thick-shelled varieties are to be distributed to Nigerian farmers because (1) thin shelled varieties may exhibit as much as 25% sterility after self-pollination; (2) thick shelled strains have larger kernels and (3) the best yielding thick-shelled strains produce more oil than the best thin shelled strains.
The following characters have been shown to be determined genetically, at least in part: degree of self-sterility and oil content. An attempt was made to analyse the effects of environment and genotype on the latter character and it was found to be proportional to the number of bunches which is probably an inherited feature.
A preliminary cytological investigation of sterile thin shelled strains revealed meiotic irregularities.

78. TOOVEY, F. W. and CAMPBELL, G. K. G. 633.855.34:581.162.5:575.113
Third annual report of the Oil Palm Research Station, Nigeria. Part B. Selection, breeding, and other botanical investigations. 1941–42 : Pp. 8.

The progeny from crossing thick and thin shelled strains of palm have shown a promising type of fruit and a low degree of self-sterility.
Further areas at the main station have been planted, the strains used including thin shelled types from Aba, N'dian and Sierra Leone, and Deli palms from Malaya. These plantations should be useful for general breeding requirements and for studying the inheritance of fruit form and sterility.
Selection C.A. 703, planted at Ibadan, has shown an increase of 170% and 60% in oil and kernel content respectively over unselected strains. A corresponding increase of 60% and 20% was found at Benin. The best strains of thick shelled palm at Aba exceeded thin shelled strains in oil content by 30%.
A naturally pollinated bunch of *Elaeis guineensis* var. *idolatrica* produced offspring segregating in the proportion of 1:1 for normal and *idolatrica* leaf types; it is concluded that the *idolatrica* leaf is determined by a single dominant gene and since it can be recognized in the seedling stage, it may be useful to breeders.

RUBBER PLANTS 633.91

79. 633.913:575(73)
Rubber from guayule.
Trop. Agriculture, Trin. 1943 : **20** : 161–63.

A general account of guayule is presented which includes a reference to the breeding programme of the Inter-continental Rubber Company which has produced strains yielding up to 20% rubber at five years of age.

80. Zotov, V. D. and White, E. P. 633.913:575.22(93.1)
Rubber production in New Zealand. Trials with kok-saghyz.
N.Z. J. Agric. 1943 : **67** : 75–78.

Much variation has been observed in the New Zealand plantations of *Taraxacum kok-saghyz*. Leaf shape, time of flowering, degree of root branching, and rubber content are among the characters affected.

81. Howes, F. N. 633.913–1.524(41)
Russian rubber plants.
J.R. Hort. Soc. 1943 : **68** : 305–06.

The three rubber containing species, *Taraxacum kok-saghyz*, *T. megalorrhizon* and *Scorzonera tau-saghyz*, have been introduced into Great Britain, the first mentioned being the most promising. Although tolerant to a wide range of climatic conditions, *T. kok-saghyz* germinates unevenly and lacks vigour in the seedling condition. The species is variable and it is hoped that improvement might be effected by selection.

FRUITS 634

82. Ingram, C. 634.2:582:575.12
The Yingtao or Chinese fruiting cherry.
J.R. Hort. Soc. 1943 : **68** : 307–09.

The author discusses the taxonomic status of *Prunus pseudocerasus*. It is suggested that *P. dawyckensis* is the wild prototype of this species which has been successfully crossed with *P. avium* (var. Guigne d'Annonay) and *P. Cerasus* (var. Coe's Carnation).

83. Grubb, N. H. 634.711–2–1.521.6:581.6:575.12(42.23)
Five new raspberry seedlings.
Ann. Rep. E. Malling Res. Sta. 1942 (1943) : 31–33.

Five new raspberry varieties are described. E(33/132), derived from Preussen x (Lloyd George x Pyne's Royal), is a very vigorous plant, growing up to 7 ft. high; it produces large firm fruit, moderately bright red in colour, which have good dessert quality. G(32/166), from Preussen x Lloyd George, is a very vigorous type sometimes reaching a height of 8 ft.; it produces large firm fruit, very bright red in colour which have good dessert quality. J(33/54), from Preussen x (Lloyd George x Pyne's Royal), is a vigorous plant averaging in height between 6 ft. and 7 ft.; its fruits are bright red, large and firm; its dessert quality is moderate, with a rather sweet flavour. K(33/115), from Preussen x (Lloyd George x Pyne's Royal), is also a vigorous plant reaching a maximum height of 6 ft. or more, its fruits are moderately bright red, large and firm; its dessert quality is moderate but occasionally "flat". L(34/42), a seedling of Preussen x Baumforth seedling A, is very vigorous and may reach a height of 8 ft.; its fruits are large and light bright red in colour but the flesh tends to be soft and the fruits unsuitable for canning; dessert quality is good and the flavour sweetish or sub-acid.

All these varieties except E appear to have a fair degree of resistance to cane blight. Variety L may be susceptible to mosaic virus 2.

84. 634.75:575.12
Strawberry "Melody", raised by Arthur G. Sainsbury, Mangere, via Otahuhu.
J. N.Z. Inst. Hort. 1943 : **12** : p. 74.

A new strawberry variety, Melody, is described. It is a seedling of Captain Cook and Delicatessen and is more robust and yields better than its parents.

85. Dodds, K. S. 634.771:576.356.2:581.162.5:581.163
Genetical and cytological studies of *Musa*. V. Certain edible diploids.
J. Genet. 1943 : **45** : 113–38.

A detailed account is given of the course of meiosis in the pollen mother cells of the following five varieties of parthenocarpic diploid bananas: I.R.65, I.R.32, I.R.56*, I.R.11, and I.R. 143. All of these, with the exception of I.R.32, exhibit similar meiotic configurations. Most of the chromosomes at metaphase I appear as bivalents but occasional univalents, trivalents or tetravalents may be found. Chromosome bridges were formed in a number of cases during anaphase I and an unusual case in which a chromatin fragment was left in the middle of the

* Listed as I.R.65 through a typographical error.

bridge is described. In varieties I.R.65, I.R.56 and I.R.11, some of the pollen mother-cells behave abnormally and 22 unassociated or loosely associated chromosomes appear. Normal cell division does not follow this condition and monad, dyad, and triad pollen grains are produced with either diploid or tetraploid chromosome complements.
Variety I.R.32 has a low degree of metaphase association and no configuration higher than the bivalent is formed. The meiotic irregularities following this arrangement are described.
The degree of male and female fertility has been investigated in these varieties and it is pointed out that the high sterility of most of the forms necessitates the utilization of cross-pollination in the determination of female fertility. As this may involve cross-compatibility effects, the technique can only give approximately accurate results.
These cytological results are discussed with reference to the subject of structural hybridity. It is concluded that I.R.65 I.R.56, I.R.11, and I.R.143 are structural hybrids, the last mentioned being the least complex. Variety I.R.32 is regarded as an interspecific hybrid.
Parthenocarpy and female sterility are closely associated and are hereditary characters under genic control. Moreover, since these characters occur both in diploids and polyploids, they may exist independently of polyploidy.
It is possible that a significant correlation exists between parthenocarpy, high auxin concentration and the production of polyploid gametes.
The evolutionary sequence in the banana complex is believed to be as follows:—
Parthenocarpy and female sterility probably arose as gene mutations in fertile diploids; these were selected by man and propagated vegetatively during which process they became structural hybrids and male sterile; polyploidy probably arose before vegetative reproduction became obligatory and may have been selected on account of the larger fruits produced.

FORESTRY 634.97

86. CHAMPION, H. G. 634.97:575
Seed selection in forestry.
Nature, Lond. 1943 : **152** : p. 354.
The writer points out the inadequacy of the proposals made in the White Paper on Post-War Forest Policy with reference to seed selection and tree breeding.

87. ADAMSON, R. S.,
ESTERHUYSEN, E. and
PHILLIPS, E. P. 634.973:582:001.4(68)
Some changes in nomenclature. IV.
J. Sth. Afr. Bot. 1943 : **9** : 137–40.
It is proposed that the generic distinction between *Buxus* Linn. and *Notobuxus* Oliv. should be amended as follows: *Buxus*, stamens 4, anthers supported by filaments; rudimentary pistil present in male flower; and *Notobuxus*, stamens 4–8; anthers sessile; rudimentary pistil absent in the male flowers. The nomenclatural changes that this emendation would produce are indicated.

VEGETABLES 635

88. 635.25:576.16
STEARN, W. T. 635.26:576.16
The Welsh onion and the ever-ready onion.
Gdnrs' Chron. 1943 : **114** : 86–88.
The author has concluded that the Welsh onion of the eighteenth and early nineteenth centuries was *Allium fistulosum*. Another cultivated variety, sometimes known as the Welsh onion, belongs to another species and the designation of *A. Cepa perutile* is proposed for it. The distinguishing features of *A. fistulosum* and *A. Cepa* are described and the principal varieties listed. A short discussion of the probable origin of these forms is included.

89. WOKES, F. and
ORGAN, J. G. 635.64:581.6:576.356.5:577.16
Oxidizing enzymes and vitamin C in tomatoes.
Biochem. J. 1943 : **37** : 259–65.
The relation between Vitamin C content and the concentration of ascorbic acid oxidase is described and the conclusion drawn by Sansome and Zilva, that polyploids have a significantly higher vitamin content, is confirmed.

90. VACHHANI, M. V. 635.657:575.242:575.113
Further inheritance studies of two mutations in *Cicer*.
Indian J. Genet. Pl. Breed. **1942** : **2** : 173–77.
The inheritance of the tiny-leaved and compound-leaved mutants of *Cicer* has been investigated. The following bifactorial scheme is proposed for the homozygotes of the three phenotypes observed: normal form, $T_{lv}T_{lw}S_{lw}S_{lw}$; tiny-leaved mutant, $T_{lv}T_{lw}s_{lw}s_{lw}$; and simple-leaved $t_{lv}t_{lw}S_{lw}S_{lw}$ or $t_{lv}t_{lw}s_{lw}s_{lw}$.

91. 635.67:575(42)
Sweet corn.
Adv. Leafl. Minist. Agric. Fish., Lancs **1943** : No. 297 : Pp. 4.
Some of the American varieties of sweet corn which might grow satisfactorily in this country are described. It is stated that new hybrid varieties, better adapted to English conditions, may be expected within the next few years.

Part II. Foreign.

STATISTICS 519

92. BERKSON, J. 519.24
Experience with tests of significance: a reply to Professor R. A. Fisher.
J. Amer. Statist. Ass. 1943 : **38** : 242–46.
The author, in reply to a note by Fisher, amplifies his reasons for distrusting the usually accepted interpretation of significance tests.

93. CURTISS, J. H. 519.24
On transformations used in the analysis of variance.
Ann. Math. Statist. 1943 : **14** : 107–22.
If X is an observation so distributed that the variance σ_X^2 depends on the mean μ of X, it may be necessary to transform the variable to T, $T = f(X)$, where the variance σ_T^2 of T is independent of μ. This paper provides a general mathematical theory for certain types of transformation now in use, in particular the square root, inverse sine and logarithmic transformations. It contains a full set of references which are mostly non-mathematical and descriptive.
The main results of the paper are as follows:—
(i) It is not justifiable to argue that $\sigma_T = f'(X)\,\sigma_X$.
(ii) In most cases there is no function $f(X)$ such that $f(X)$ and σ_T are both independent of μ. The best that can be done is to get an asymptotic approximation where σ_T is independent of one parameter n (but not necessarily of the other parameters θ) as $n \to \infty$.
(iii) If the distribution of X depends on a number of parameters, of which n is one, i.e. $X = X_n$, $\mu = \mu_n$; and if the distribution of $(X_n - \mu_n)\,\psi(\mu_n)$ tends to normality with mean zero and variance c^2 independent of n as $n \to \infty$ in any way, so also does the distribution of $f(X) - f(\mu_n)$ with the same mean and variance, where $T = f(X) = \int_a^x \psi_n(x)\,dx$. Thus, if X is distributed as a Poisson with parameter n, it is known that $(X - n) / \sqrt{n + \alpha}$ tends to a normal deviate as $n \to \infty$ where α is any arbitrary constant.
$\therefore T = f(X) = \int^x \frac{dx}{\sqrt{x+\alpha}} = 2\sqrt{X + \alpha}$, and the distribution of $T - 2\sqrt{n + \alpha}$ will tend to normality with mean zero and variance unity, as $n \to \infty$.
(iv) Other distributions of X are considered, such as the gamma distribution and the binomial.
S. N. C.

94. MATHISEN, H. C. 519.24
A method of testing the hypothesis that two samples are from the same population.
Ann. Math. Statist. 1943 : **14** : 188–94.
Suppose $x_1, x_2 \ldots x_{2n+1}, y_1, y_2 \ldots y_{2m}$ are the two samples (by hypothesis from the same population) arranged in order of magnitude. If $y_{m1} \leqslant x_{n+1} \leqslant y_{m1+1, m1}$ is distributed about a mean of m independently of the original population. The paper gives 5% and 1% significance levels for m_1, for values of n, m, ranging from 5 to 500. An extension is given using the quartiles; thus if $x_1\, x_2 \ldots x_{4n+3}, y_1\, y_2 \ldots y_{4m}$ are the two samples arranged in order of magnitude, and if m_1 of the y's is less than x_{n+1}, m_2 lies between x_{n+1} and x_{2n+2}, m_3 lies between x_{2n+2} and x_{3n+3}, the distribution of $m_i\,(i = 1 \ldots 4)$ is again independent of the original population. If $C = \frac{1}{9m^2}\sum_{i=1}^{4}(m_i - m)^2$, the distribution of C is given by Thompson (1941), and thus may be used as a single test of the hypothesis. S. N. C.

95. SIMON, H. A. 519.24
Symmetric tests of the hypothesis that the mean of one normal population exceeds that of another.
Ann. Math. Statist. 1943 : **14** : 149–54.
Using the ideas of the sample space and of the power of a test as developed by Neyman and Pearson, the paper provides a uniformly most powerful test for whether the mean M_x of one normal population is greater than or less than the mean M_y of another, provided that the two standard deviations σ_x, σ_y are equal: if the two samples have equal sizes and means $\bar{x}, \bar{y}$, we

assume that $M_x > M_y$ if $\bar{x} > \bar{y}$ with an error of, at the most, one in two. Where $\sigma_x = \sigma_y$ the above test is not uniformly most powerful; but if we pair each x with a y and take $u_i = x_i - y_i$, while testing for the sign of $\bar{u}$, this test is uniformly most powerful (although in a more restricted sense). Thus if $\bar{u} > 0$ we suppose that $M_x > M_y$. The distinction between the two tests is a delicate theoretical point concerning the power of the tests; in practice $\bar{u} = \bar{x} - \bar{y}$ so that we do in fact perform the same operations in both cases. S. N. C.

96. Welker, E. L. and
Wynd, F. L. 519.24
Influence of unknown factors on the validity of mathematical correlations of biological data.
Plant Physiol. 1943 : **18** : 498–507.

The authors discuss the limitations of the method of statistical correlation in determining relationships between biological variates.

97. Bondorff, K. A. 519.24:631.421
Arbejdsfeljlens Størrelse ved lokale Forsøg. (**The magnitude of experimental error in field experiments).**
Nord. JordbrForskn. 1942 : **24** : 151–52.

The results of 671 field experiments carried out in the last few years show an average standard error of 2·35% of the mean yield as compared with the 3% of older experiments. The standard error of "row" experiments was 2·40% whereas those of 5 × 5, 4 × 4 and 3 × 3 Latin square experiments were 2·66, 2·61 and 2·48% respectively. Experiments on roots gave lower standard errors (2·21%) than experiments with cereals (2·56%). S. G. H.

98. Dorph-Petersen, K. 519.24:631.421
Fejlberegning paa Forsøg med systematisk Parcelfordeling. (**Estimation of standard error in experiments with systematic plot distribution**).
Nord. JordbrForskn. 1942 ; **24** : 140–50.

Tedin's studies of the influence of plot distribution on the estimation of error has been extended in order to allow the application of analyses of variance to experiments with systematic plot distribution. In a discussion of experiments on 5 treatments with five fold replication in square formation, the writer suggests that an estimate of error for a "knight's move" design may be obtained from the sum of square corresponding to the orthogonal "knight's move" grouping of plots. This is tested on a batch of 150 uniformity trials; the excessive number of significant effects obtained in the dummy treatments is considered not to be inherent in the method. Similar treatments seem also applicable to experiments in which the plots, in certain circumstances, are not arranged as in the "knight's move" design. S. G. H.

99. Torrie, J. H.,
Shands, H. L. and
Leith, B. D. 519.24:631.421:633.1
Efficiency studies of types of design with small grain yield trials.
J. Amer. Soc. Agron. 1943 : **35** : 645–61.

The precision of lattice designs has been compared with that of randomized complete blocks, using cereal crops. An average increase in precision of 9% is recorded when inter-block information was considered but a decrease of 8% when such information was ignored. When quadrats were employed, it was found that precision was increased more by increasing the number of replications than by using a larger number of quadrats per plot.

100. Hubbs, C. L. and
Perlmutter, A. 519.271.3
Biometric comparison of several samples, with particular reference to racial investigations.
Amer. Nat. 1942 : **76** : 582–92.

The graphical method of Dice and Leraas for presenting comparative data on a series of samples is developed. It is decided that the generally accepted formula for calculating the standard deviation of the difference between two means,

$$\sigma_\Delta = \sqrt{(\sigma M_1)^2 + (\sigma M_2)^2},$$

is both more convenient and more desirable than its alternatives.

101. WALD, A. 519.271.3

On the efficient design of statistical investigation.

Ann. Math. Statist. **1943 : 14** : 134–40.

The paper is divided roughly into two sections: I, dealing with the linear hypothesis and II, dealing with the Latin square.

I. In the analysis of variance, the Latin square, and other similar types of experiment, we are assuming essentially that an observation y_α from a sample of N can be expressed (barring random errors) in the form

$$y_\alpha = \beta_1 x_{1\alpha} + \beta_2 x_{2\alpha} + \ldots + \beta_p x_{p\alpha}\, y_\alpha (\alpha = 1, 2, \ldots N)$$

where $x_{i\alpha}$ $(i = 1, 2, \ldots p)$ are known constants and $\beta_1, \beta_2 \ldots \beta_p$ are unknown constants. Then a linear hypothesis can be expressed in the form

$$g_{i_1} \beta_1 + g_{i_2} \beta_2 + \ldots + g_{i_p} \beta_p = g_i \ (i = 1, 2, \ldots r \leqslant p).$$

Using then a statistic distributed as Fisher's F, it is shown that by choosing the x's correctly we may arrive at a test which is in some senses the most powerful.

II. Suppose that we are interested in the possible significance of the differences between the yields of m different varieties. It is shown that the most efficient design (provided there are no interactions) is the m x m Latin square, wherein one variety appears once in every row and in every column, i.e. for this design, the power function is a maximum. Similarly if we are testing simultaneously whether m varieties or m treatments are significantly different amongst themselves, the most efficient design is the Graeco-Latin square. S. N. C.

BREEDING 575

102. 575:633

Fifty-fourth annual report of the South Carolina Experiment Station of Clemson Agricultural College for the year ended June 30, 1941: Pp. 182.

This report includes information about the following items:—

Fusarium

Various physiological races of the same species of *Fusarium* have been shown to attack cotton, sweet potato and tobacco. The species pathogenic to tomato and water-melon appear to be restricted to their normal hosts.

Cotton

Super 7 has been selected for resistance to wilt, fibre length and fibre uniformity.

Considerable work has been done with Sea Island varieties but it has not been found possible to obtain satisfactory forms from hybrids between Sea Island cotton and Upland varieties although breeding for this purpose has been in progress since 1935. Fibre characters however appear to be inherited independently of general plant characters and there appears to be some prospect of transferring the fibre character of Sea Island strains to Upland cotton by a process of hybridization and back-crossing. Strain Z10 of Seabrook is being selected for higher lint percentage and strain 12B2 for longer staple. St Vincent, a variety resistant to angular leaf-spot, has produced a line with larger bolls in Florida. Progeny of the following hybrids are being investigated: Seabrook x Andrews, Seabrook x Westberry, Seabrook x St Vincent and (Seabrook x Westberry) x (Puerto Rican x Bleak).

Genetical studies have been made with the progeny of three crosses. Half and Half x King Blackseed has been studied for the inheritance of lint length and lint percentage, Tidewater x Rowden for staple length and lint percentage and Greenseed x Rowden for seed colour, staple length, lint percentage, seed weight, weight of seed cotton per plant, number of bolls per plant and weight of seed cotton per 100 bolls.

Grapes

Conditions for germination of the muscadine varieties Scuppernong and Hunt have been ascertained.

Cucumber

Porto Rico No. 37 and China have been used in hybridization experiments in order to introduce resistance to downy mildew into cultivated varieties.

Cantaloupe

Green-fleshed Rocky Dew and Cuban Castillian are being used for breeding disease-resistant varieties.

103. 575:633(48.5)

Årsberättelse avgiven den 28 januari 1943 av Akademiens Sekreterare. (**Annual report issued 28th January 1943 by the Secretary of the Academy**).
K. LantbrAkad. Tidskr. 1943 : **82** : 11–34.

In this report from the Royal Agricultural Academy of Sweden work is reported on the relation between cold resistance and the osmotic pressure of the cell sap. Recent investigations suggested that mineral substances and enzymes also play a part in determining cold resistance partly by their effect on the "protein bodies" in the plasma.
Plant breeding is proceeding apace with particular concentration on winter-hardiness in autumn cereals. New crops too, such as oil and textile plants, are now included in the breeding programme.
In general the quality of various crops has become of importance in breeding. Crop improvement by chromosome doubling has been extended to include root crops, herbage plants and oil plants. Progress must however be rather slow, as usually hybridization and selection must subsequently be undertaken with any new forms with the double chromosome number to obtain the desired types.
In the course of an intensive study of the potato, evidence has been found suggesting that protein content is partly a varietal character.
Cultural experiments on oil crops, medicinal plants and herbs, as well as physiological studies on *Taraxacum kok-saghyz*, are in progress.
Observations during the recent severe winters have shown that frost resistance or susceptibility is primarily genetically determined in the varieties of fruit trees and stocks. An institute for research on fruit breeding was set up in 1941 at Balsgård near Kristianstad and is now working on the production of high quality triploid varieties by hybridization of tetraploid seedlings of various fruit trees.
The great variation that has been found in spruces in resin, lignin and cellulose content, etc., should be of importance in forest tree breeding.

104. 575:633(48·5)

Utsädesföreningens extra möte under Lantbruksveckan 1943. (**Seed Associations extra meeting during the Agricultural Week 1943**).
Sverig. Utsädesfören. Tidskr. 1943 : **53** : 112–15.

A short report was read on the work of the Association, including investigations on tobacco and the breeding of flax, hemp, soya bean, maize and lupins, for all of which state grants were received.
Torssell read a paper on the cultivation, breeding and seed production of blue lucerne, while Sidén reported on plant breeding at the Jämtland Branch Station (both reviews to be published later); Åkerman summarized what the Association had done in breeding cereals, herbage plants and other crops.
Among the new winter-hardy autumn wheats are: Borg, intended for western Sweden; Variety No. 01331, from a Skandia and Halland land wheat cross; and two varieties from Ergo x Gluten, bred at the Ultuna Branch Station. A stiff strawed, high yielding and very winter hardy variety of interest for Dalarne and Southern Norrland has been obtained from central Swedish land wheat.
Progress spring wheat is also mentioned (cf. Abst. 173).
The oats are represented by Sol II and the black oat No. 01331 (from Guldregn I x Orion II) which seems likely to be released as Orion III; it is only a few days later than Orion II, has stiffer straw, better grain quality and higher yield.
The new barley Freja is a bit earlier than Kenia and gave good yields last year. The new, early, stiff-strawed Edda barley represents an advance of about 10% in grain yield.
Kungsråg II and Björn are also regarded as promising ryes, the first for its strong straw and high cultivation value and the second for its reliable winter hardiness and high yield.
Some new peas, herbage crops and potatoes (for table, fodder or industrial use) have been produced as well as a new strain of Barres beet, a table swede and two new turnips, one of which is specially resistant to club root (cf. "Plant Breeding Abstracts", Vol. XIII, Abst. 441).

105. PARROTT, P. J. 575:633(74.7)
Sixty-first annual report for the fiscal year ended 30 June, 1942.
N.Y. St. Agric. Exp. Sta. 1942 : Pp. 96.

In the report of the division of plant pathology it is noted that of the canning varieties of bean tested, the commercial strain Idaho Refugee, U.S. No. 5 and the Sensation strain were again resistant to mosaic. Other hybrids tested were resistant and showed promise, but none was completely resistant to bacterial blight.

Tests for resistance of cabbages to yellows showed that the resistant, Geneva Seneca, market and kraut type selection had been stabilized as to type and disease resistance while the Danish resistant selections were still of mixed types. The results are briefly given of field tests on a number of varieties. All resistant varieties yielded rather less than the non-resistant strain. To produce a strain of cauliflower resistant to black-rot a large number of crosses and selections have been made but results cannot yet be expected.

The work on fruit breeding was carried on on the same lines as previous years. Peach crosses were made to secure high quality commercial peaches that ripen earlier than Elberta and varieties suitable for freezing. Some nectarine and apricot crosses have been made to secure productive commercial varieties. Sweet cherries were crossed for types more resistant to brown rot and cracking and that are ripe throughout the cherry season. With pears, the aim was to produce blight resistant kinds equal to the Bartlett in size, appearance and quality and ripening earlier and later than Bartlett. For apples, a late-ripening commercial apple was desired and in plums, a higher quality commercial type.

Strawberry crosses were made to secure an autumn bearing variety for New York and blackberry crosses for varieties superior to Eldorado. A few grape crosses were made to secure hardier, higher quality, early maturing seedless varieties. Mention is made of some of the fruit varieties produced by the station and now being grown commercially with success.

The red raspberry seedling No. 13618 is very resistant to virus diseases and is to be named Milton.

A number of filbert seedlings are under observation.

Cytological investigations include work on the cytology of sterile intravarietal and fertile intervarietal tetraploids of the snapdragon.

Tests with chemicals other than colchicine, for producing polyploids were made on barley and peas. Iodonaphthalene and bromonaphthalene are nearest to colchicine; they are very effective on barley but less so on peas. Next in order is chloroacenaphthalene with trichloroaniline and trichlorobenzene less effective. Other chemicals tested for their capacities to increase cell division are laevulinic acid, staymone, "Rootone", sulphanilamide, sulphathiazol and sulphapyridine. Further studies were made on the effect of X-rays on the chromosomes of *Tradescantia* and on an analysis of chromatid relational coiling in microspores of *Trillium grandiflorum*.

Experiments were made with X-rays on the Nystate tomato which is normally 50% pollen sterile. Strains have been selected with less than 50% good pollen for crossing with the normal variety and for selfing and intercrossing to obtain progenies carrying translocations for use in further breeding work. The effect of colchicine treatment on *Antirrhinum* is noted.

The selection and introduction of superior seedling rootstocks for fruit trees continues.

Severe tests were given to the progeny from 22 different crosses of squash for resistance to mosaic viruses. The most promising crosses on which future efforts will be concentrated are Japanese Pie x Crookneck and Japanese x Boston Greek.

Work continues on strain tests of sweet corn including Golden Bantam, new hybrid inbreds and top-cross varieties.

Experiments are in progress to discover better varieties of peas for the increased demand for canning and freezing and several promising varieties are mentioned.

Squash breeding is in progress to develop superior varieties for canning and improved types for market.

Several crosses in musk-melon have produced new types that are now practically fixed. Of the varieties of *Cucumis melo* tested, four of the variety *conomon* appear to carry considerable resistance to cucumber mosaic. A number of varieties of various vegetables have been tested for suitability for dehydration.

Progress is noted in the production of improved varieties of canning beans and tomatoes.

From the X-ray treatment of bean and tomato seed it is hoped that following crossing and self-pollination there may arise changes in the genetic structure and the possibility of new forms of practical value. R. M. I.

106. 575:633(75.8)

Fifty-fourth annual report Georgia Experiment Station, Experiment, Georgia, of the University System of Georgia for the year 1941-42 : Pp. 111.

Oats
The progeny of Lee x Victoria is being selected for yield and resistance to crown-rust and smut.

Cotton
Coker 100-wilt, a new variety derived from Chevewilt x Coker 100, combines earliness with wilt resistance. Varietal tests are reported, special attention being paid to wilt resistance. The strain 136–4–4 is being selected for such characters as lint yield and earliness.

Sweet corn
Cherokee is recommended on account of its having some resistance to ear worm.

Grapes
Varietal differences in susceptibility of Muscadine varieties to black rot (*Guignardia*) are reported.

Tomato
Selections from *L. esculentum* x *L. pimpinellifolium*, combining resistance to nematode root-knot, *Fusarium* and *Septoria*, are being crossed with large fruited commercial varieties.

Water-melon
S87 is still the best wilt resistant variety in field tests. *Citrullus Colocynthis*, a wild species with more wilt resistance than any cultivated variety, has been crossed with commercial types. When *C. Colocynthis* was used as the female parent, 36 fruits were obtained; the reciprocal cross was unsuccessful. The hybrids have been back-crossed to edible varieties.

Turnips
Varietal differences in vitamin C content have been examined.

Soya benas
Field tests for root-knot susceptibility have been made.

Peanuts
Hybridization for yield and disease resistance is in progress. G.F.A. Spanish is one of the most promising varieties.

Snap beans
Varieties are being crossed in order to produce new types resistant to root rots and nematodes. Resistance to ashy stem blight (*Macrophomina Phascoli*) and southern blight (*Sclerotium Rolfsii*) is rare but a few promising lines have been obtained. There is some evidence for the identity of *Macrophomina Phaseoli* with some strains of *Sclerotium bataticola*.

107. 575:633(75.8)

Twenty-second annual report 1941–1942.
Bull. Ga Cst. Pl. Exp. Sta. 1942 : No. 35 : Pp. 154.

The following items of interest to plant breeders are included in this report:

Maize
Breeding for resistance to disease and weather damage is in progress.

Forage grasses
Tifton 35, a new selection of Bermuda grass, is recommended for its heavy yield. The Tift variety of Sudan grass is being bred for reduced cyanide content. A short leafy selection of Napier grass suitable for late grazing is reported together with a new strain of Dallis grass resistant to *Colletotrichum graminicolum*. Bahia grass is being bred for resistance to cold.

Cotton
Tifton Station 21, an individual plant selection from Dixie Triumph, combines good yield and quality with wilt resistance and adaptability to conditions in South Georgia.

Tobacco
Strains of shade tobacco resistant to black shank and root knot are being crossed with each other.

Peanut
C.F.A. Spanish is a selection from Spanish and combines a high yield with disease resistance.

Water-melon
S87–17S, a selection from Cuban Queen x Iowa Belle, is resistant to wilt and anthracnose and is as prolific as Cuban Queen. Several strains of X32 have similar qualities.

108. 575:633(77.2)

Research aids farm progress.
53rd Rep. Purdue Univ. Agric. Exp. Sta., Lafayette, Indiana 1940 : Pp. 112.

Wheat
Two new varieties of wheat are reported, both of which are winter-hardy, have a good standing ability, are moderately resistant to rust and scab, and almost immune to loose smut and mosaic.
A number of races of loose smut attacking winter wheats have been differentiated. Trumbull and Kawvale are resistant to all races and Purdue No. 1 and Wabash to some.
Hybridization for resistance to Hessian fly is proceeding using Illinois No. 1 W38, Illinois No. 1 x (Norka x Carina), and Marquillo as sources of resistant genes.

Maize
Significant differences in the yield of a double cross have been observed when the order of crossing is changed. Indiana hybrid 608 B, (A x Tr) x (WF 9 x Hy), produces 2·7 bushels per acre more than Indiana hybrid 608, (A x Hy) x (WF 9 x Tr). A new introduction, Indiana hybrid 210, (HF5 x M 14) x (WF 9 x I 234), is earlier than other Indiana hybrids and yields more than the members of the 400 series.
Inbred Pr carries a recessive factor determining susceptibility to *Helminthosporium Maydis*.

Tomato
A wilt immune strain of *Lycopersicon pimpinellifolium* has been crossed to Baltimore and Rutgers and the back-cross progenies are now in the F_4 and F_5 stages. Satisfactory fruit sizes have been obtained. Thirty F.P.I. tomato accessions exhibit resistance to *Septoria Lycopersici* or *Macrosporium Solani* or to both. In the F_1 of F.P.I.1278 x Indiana Baltimore, resistance to *Septoria* behaves as a recessive. Several strains of *L. hirsutum* are immune to *Septoria* and *Macrosporium* and resistant to wilt and mosaic. Twelve F_1 progeny have resulted from the cross Rutgers x *L. hirsutum*.

Soya bean
Two new yellow-seeded varieties have been obtained suitable for processing. They contain 3–4% more oil and yield better than standard varieties in south-west Indiana.

109. Reed, H. J. and
Lambert, W. V. 575:633(77.2)
Research solves farm problems. Report of the Director, Purdue University Agricultural Experiment Station for the year ending June 30, 1941 : Pp. 114.

Wheat
Inheritance of cold resistance, straw strength and the various components of commercial quality were found to be determined by multifactorial schemes. The factors controlling straw colour and coleoptile pigmentation are closely linked.
Natural crossing in wheat in 1939 was found to occur in 0·33% of the cases examined.
Hybridization is in progress to produce cold-resistant soft winter wheats. Soft red winter wheats are being bred for stem rust resistance. Trumbull and Wabash have each been crossed with a Hope-Hussar selection resistant to stem rust, leaf rust, bunt and mildew. Progeny have been obtained resistant to these fungi and also to loose smut and mosaic. Wabash has been crossed with Michigan Amber selection 29–1–1–1 in order to study the inheritance of its resistance to nine races of *Puccinia rubigo-vera Tritici*. Resistance, which is a recessive character, is determined by a single gene, the same for each of the races investigated.
Resistance to Hessian fly has been observed in the following introduced varieties: Beirao, Portugez, Ribeiro, Da Terra, Aza de Corvo, Tremez preto, Tremez rijo, Tremez molle, Greek 10 and San Martin.

Maize
Two new hybrids have been released. Indiana 901 (K6 x H21) x (H22 x 23) is a white type suitable for southern Indiana; it yields well but lodges badly. Indiana 703 (K6 x H21) x (H22 x 33–16) is similar to the first but is earlier and suitable for central Indiana.
The grain content of cystine and arginine is determined by genetic factors but no such relation could be established for tryptophane, tyrosine or histidine. Much variation in carotenoid content has been found between inbred lines of maize.
A negative correlation coefficient, hardly large enough to be significant, has been found between yield and susceptibility to *Diplodia*. Varietal differences in susceptibility to the corn borer can be demonstrated, inbred line R4 being markedly resistant. Resistance to the corn leaf aphis also varies with the variety and is frequently correlated with resistance to the corn borer; some lines were observed, however, in which resistance to aphis co-existed with susceptibility to the borer.

Oats
Hybridization for resistance to smuts and rusts is in progress.

Red clover
Strains are being selected for hay quality and seed productivity.

Potato
The varieties, Hidenburg [Hindenburg?], Jubel and Arnica, and a number of seedlings, are resistant to scab.

Tomato
Back-crossing the progenies of Missouri strain 160 x Baltimore and Missouri strain 160 x Rutgers has now reached the F_6. It is hoped that good quality types resistant to *Fusarium* wilt will be obtained. Forty new accessions of tomato have been selected for resistance to *Septoria Lycopersici* and *Macrosporium Solani*. No segregation for any character was discoverable in the F_2 of Indiana Baltimore x *L. peruvianum* F.P.I. 127829; all the progeny were susceptible to defoliation diseases. The F_2 of Rutgers x *L. hirsutum* F.P.I. 126445 produced no types with high resistance to *Septoria*. Indiana Baltimore has been crossed both to Summerset and All Red and selections have been made for resistance to high temperatures and sun scalding.

Conifers
Winter hardy types of *Thuja orientalis* are expected.

Rhubarb
Varieties have been selected for vegetative vigour, petiole size and petiolar colour.

Soya beans
Breeding for high oil content, high iodine number and high protein content continues.

Sweet corn
New hybrids have been obtained from crossing Purdue 51 and Purdue 39 with Illinois Country Gentleman inbred No. 9.

110. 575:633(79.7)

Fifty-first annual report for the fiscal year ended June 30, 1941.
Bull. Wash. Agric. Exp. Sta. 1941 : No. 410 : Pp. 142.

Information is given in the report about the following crops:—

Wheat
The new variety Brevon has inferior baking quality but should be useful for breeding on account of its high yield, stiff straw and bunt resistance. A selection from Oro x Federation combines good yield with satisfactory milling and baking qualities while a selection from Comet x N. No. 1121 is resistant to stem and leaf rust. Simple Mendelian inheritance for leaf rust resistance, straw colour and awnletting has been observed in the F_1 and F_2 of H44—Reward—Baringa x Hard Federation—Dicklow. Selections have been made from a cross between wheat and *Agropyron elongatum* for fertility, rust resistance and vegetative vigour. Crosses have also been obtained between wheat (mainly *T. durum*) and the following species: *Agropyron trichophorum*, *A. amuense* and *A. intermedium*; in all cases the F_1 is completely sterile.
Five new races of *Tilletia Tritici* and *T. laevis* have been established, some of which are distinguished by morphological characters and by their effect on the morphology of the host.

T–13 is a selection from T–11 which apparently is a race of unstable pathogenicity; all the other races react uniformly. The hybrid selections Utah 112a–113–3 and Utah 112a–642 are highly resistant to all these races.

Barley

Two selections of Coast are very resistant to lodging. Linkage studies have been made for various characters and the genetical relationship of the various factors determining dwarf habit has been investigated.

Oats

The stiff-strawed selections of Markton have shown decreased yield. *Ustilago Avenae* and *U. perennans* (parasitic on *Arrhenatherum elatius*) have been hybridized on the latter host. Progeny obtained from the hybrid chlamydospores have shown that the naked habit is dominant to the covered and powdery spores to indurate; these two pairs of characters are unlinked. It is concluded that *U. perennans* is only a race of *U. Avenae.* Panicle types in races 1 and 3 of the buff smut have shown an irregular mode of inheritance.

Rye

Selections have been made from the crosses between rye and *Secale montanum* for fertility, resistance to ergot and good quality.

Forage grasses

At least eight physiological races of *Ustilago bullata* have been established on 36 species of *Agropyron, Bromus, Elymus, Festuca, Hordeum* and *Sitanion*; 29 out of 75 collections were found to be race 2, the common race affecting *Bromus tectorum.*

Alfalfa

This crop has been bred for wilt-resistance. Some selections from Ladak have shown a good general resistance to leaf and stem diseases.

Potato

No. 6361, a selection from Houma x Katahdin, is an early virus-resisting variety with roundish, shallow-eyed, buff-coloured tubers.

Apple

Details are recorded of the fruit sets obtained by hand-pollinating a number of varieties.

Raspberry

Black raspberries are being bred for mosaic resistance.

Strawberry

OSC 1084 has good freezing qualities and high yield but it is susceptible to root rot and Cyclamen bug. Resistance to the former has a very complicated mode of inheritance.

Blueberry

The following crosses have been made: *Vaccinium corymbosum* x an unnamed British Columbian species, (*V. corymbosum* x *V. pennsylvanicum*) x an unnamed British Columbian species, (*V. corymbosum* x *V. pennsylvanicum*) x *V. corymbosum, V. pennsylvanicum* x *V. ovatum, V. canadense* x *V. ovatum* and *V. virgatum* x *V. ovatum.*

Cranberry

Varieties have been hybridized for earliness and good quality.

Bean

A Blue Lake hybrid has shown resistance to rust and a higher yield than its parent; its canning qualities however are inferior.

111. KALKUS, J. W. 575:633(79·7)
Report of agricultural research and other activities of the Western Washington Experiment Station for the fiscal year ended March 31, 1941 : Pp. 70.

This report contains information about the following crops:—

Pyrethrum

A number of plants from Kenya flowered in the first year and these have been selected for number of flowers, height, uniformity of height and erect habit.

Sweet corn

The quality of frozen sweet corn is dependent, *inter alia,* on the degree of tenderness of the pericarp.

Raspberry
Hybridization and selection for earliness is in progress.

Strawberry
Breeding for resistance to root rot is being continued.

112. KALKUS, J. W. 575:633(79.7)
Report of agricultural research and other activities of the Western Washington Experiment Station for the fiscal year ended March 31, 1942 : Pp. 70.

This report contains information about the following crops:—

Rubber plants
Taraxacum kok-saghyz has shown a higher percentage germination than expected. Guayule is being investigated for winter-hardiness.

Raspberry
Breeding for earliness and aphid resistance is in progress.

Blackberry
Washington No. 1 (selected from Brainerd x Evergreen) is recommended for breeding purposes; it has high productivity and good quality marred however by an excessively thorny habit and poor freezing quality. Washington No. 2 may also be useful for breeding on account of its earliness and high yield.

Strawberry
Selections from Oregon (U.S.D.A.) 438 x Oregon (U.S.D.A.) 1084 combine good quality fruit with resistance to black-rust.

GENETICS 575.1

113. ROSE, M. 575.1
Les lois de l'hérédité et leur application à l'élevage. (**The laws of heredity and their application to breeding**).
Bull. Agric. Algér. 1942 : No. 84 : 31–40.

After asserting that merogonic transplantation demonstrates that specific characters are determined by cytoplasmic factors the author proceeds to discuss the minor characters determined by the chromosomes. The distinction between phenotype and genotype, Mendel's laws, the genetical significance of meiosis, and the importance of mutations are then treated in turn.

114. 575.1:633(48.5)
Lunds Universitets Årsberättelse 1940–1941. (**Lund University Annual Report 1940–1941**).
Lund 1941 : Pp. 79.

Lunds Universitets Arsberättelse 1941–1942. (**Lund University Annual Report 1941–1942**).
Lund 1942 : Pp. 80.

Cytological investigations have been carried out by Håkansson on *Pisum*.
Various workers at the Institute for Research in Genetics have conducted investigations on experimental polyploidy and interspecific hybridization of *Triticum*, *Secale*, *Hordeum*, *Phleum*, *Galeopsis*, etc.; on apomixis in *Poa*, *Rubus*, *Rosa*, *Hieracium*, and *Pontentilla*; on inbreeding in *Secale* and *Dactylis*; on X-ray mutations in *Secale*; on *Hordeum* chromosome morphology; on heteroploidy in *Allium*; on colchicine effects in *Petunia*, *Allium*, etc.; on cytological studies of *Phleum*, *Secale* and *Mirabilis*; on the relation between chromosome number and winter-hardiness; on cytogenetic studies of *Dactylis*, *Agropyron*, *Calamagrostis*, *Anthoxanthum*, and *Valeriana*; on sex determination, hormone effects and polyploidy in *Solanum*; on factor analysis of *Anthyllis*; and on heteroploidy in *Lolium* and *Festuca*.
Most of the experimental material was grown at Svalöf in collaboration with the Swedish Seed Association, though the Institute for Research in Genetics also maintains a small experimental field at Lund.
Published results have practically all been reviewed in "Plant Breeding Abstracts".
The second report contains the following information about the activities of the Botanical Institute.

H. Nilsson continued his work on the problem of species formation and the evolution of organisms. In hybridization with *Salix*, European and Japanese species were included. Two parts of the flora of Alaska and Yukon, upon which Hultén is engaged, were published and Weimarck made a cytological investigation of *Prunus* hybrids. Hjelmqvist's research included a study of plant chimaeras. Other workers conducted a concerted study of the flora of Skåne.

115. Dempster, E. R. 575.115
"Mock dominance".
Science 1943 : **97** : 464–65.

The author examines the various assumptions and implications contained in Richey's concept of "mock dominance". (Cf. "Plant Breeding Abstracts", Vol. XIII, Abst. 445).

116. Timm, E. W. 575.17
Theoretical genetics.
Proc. Iowa Acad. Sci. 1941 : **48** : 51–58.

The author elaborates the theory that the chromosome is a "linear array of biochemically differentiated units". Translocations and inversions are held to constitute decisive evidence in this respect since corresponding changes in the linkage groups are observed.
Evolutionary relationships of chromosomal configurations have been investigated with considerable success.
Three types of gene action may be recognized. In the first case, the gene has the power of self-duplication, but whether this occurs by accretion and subsequent splitting or by deposition of fresh material alongside of the old is uncertain. Secondly, the gene influences the course of development, probably by acting directly as an enzyme or as a "super-enzyme" producing other enzymes. Thirdly, the gene may mutate and, in this connexion, the author disagrees with those who regard gene effects as due to very small chromosomal aberrations. It is pointed out that were the chromosomes undifferentiated linearly, inversion would have no appreciable effect on genetic problems.
Regarding mutation rate, the hypothesis is suggested that the "height of the energy barriers which separate the alternative structures" is the determining factor.
In conclusion, the author discusses briefly whether gene mutations and chromosomal aberrations are sufficient basis for the unfolding of the evolutionary sequence.

117. Burr, H. S. 575.17:635.67:581.037:575.125
Electrical correlates of pure and hybrid strains of sweet corn.
Proc. Nat. Acad. Sci. Wash. 1943 : **29** : 163–66.

Statistically significant varietal differences have been found in the value of the potential difference between opposite ends of the longitudinal axis of sweet corn kernels. Inbred C30, which differs from P39 by only a single gene, has a very marked difference from the latter in its electrical properties.
A positive correlation was found between potential difference and the degree of heterosis.
The hypothesis is put forward that chromosome action in determining development may be partly effected by its electrical properties.

118. Dobzhansky, T. and
Holz, A. M. 575.172.3
A re-examination of the problem of manifold effects of genes in *Drosophila melanogaster*.
Genetics 1943 : **28** : 295–303.

The authors discuss the nature of pleiotropic genes.

119. Goldschmidt, R. 575.246:575.113.36
A mutant of *Drosophila melanogaster* resembling the so-called unstable genes of *Drosophila virilis*.
Proc. Nat. Acad. Sci. Wash. 1943 : **29** : 203–06.

The author describes a case in which effects previously attributed to "unstable genes" can be assigned to the action of interacting loci, one allele of which affects the threshold level of epistasis. It is suggested that cases of plant variegation investigated by Rhoades (cf. "Plant Breeding Abstracts", Vol. XII, p. 180) might be amenable to this interpretation.

576.31
120. DUFRENOY, J. 632.8
The distinction between ribose- and desoxyribose-nucleoproteins and its cytological implications.
Biodynamica 1943 : **4** : 131–52.

The biochemical theories relating to the distribution of nucleoproteins in the cell are reviewed. Chromosomes are regarded as consisting of a core of longitudinally running protamine fibres to which are attached desoxyribose nucleic acid groups in the euchromatic regions and a mixture of desoxyribose and ribose nucleic acids in the heterochromatic regions; the whole is surrounded by a histone sheath. Differential staining techniques are able to detect these various chromosome components. A valid distinction is believed to exist in the resting stage of certain plant cells between the reticulum and the prochromosomes. The former cannot be regarded as an artefact and is stained positively by Feulgen's reaction, thus proving to contain desoxyribose nucleic acid.
Evidence for the diffusion of histones and ribose nucleic acids from the nucleus to the cytoplasm is presented but the "chromidial" theory of nuclear extrusion of deeply-staining particles is rejected. The contrast between the occurrence of desoxyribose nucleic acid in the nucleus and its complete absence in the cytoplasm is stressed; cytoplasmic particles such as the mitochondria and the plastids contain ribose nucleic acid only, a point wherein they resemble the viruses which are regarded consequently as having a cytoplasmic origin.
Both yeasts and bacteria have been demonstrated to contain particles of desoxyribose and ribose nucleic acids, thus establishing a homology with the cytology of higher plants. Tumours are believed to be caused, at least in part, by an excessive concentration of nucleic acids.

121. MÁZIA, D. 576.312
Enzymes and nucleic acid synthesis in the cell.
Proc. Mo. Acad. Sci. 1942 : **7** : p. 91.

An investigation has been made in order to trace the source of the increased mass of chromatin formed during cell multiplication. Phosphatase activity (necessary for the formation of nucleotides) was found to be distributed both in the nucleus and the cytoplasm while polynucleotidase could only be detected in the nucleus.

122. HUSKINS, C. L. 576.312.3
Structural differentiation of the nucleus. Reprinted from: The structure of protoplasm.
Monogr. Soc. Pl. Physiol. Iowa St. Coll. Press, Ames, Iowa 1942 : 109–26.

A general review on the morphology and functioning of the nucleus is presented. The distribution of ribose and desoxyribose nucleic acids is described and the possible roles that these substances play in the mitotic cycle is discussed. Heterochromatic regions are believed to be specialized for the production of nucleic acids and to have an important relation to the nucleolus. Two schools of thought still exist on the interpretation of the data concerning the number of strands in the meiotic chromosomes and the evidence used by the supporters of the respective theories is compared. After mentioning endomitosis, the author deals with the question of the chromosome matrix and the subject of chromosome coiling.

123. PIZA, S. DE TOLEDO (jun.) 576.312.32
Fatos velhos e novos em favor da teoria do cromossômio-unidade. (**New and old facts in favour of the theory of the chromosome-unit**).
Rev. Agric. Piracicaba 1943 : **18** : 191–207.

In continuing the former discussions (cf. "Plant Breeding Abstracts", Vol. XIII, Abst. 101), the author postulates the dorsiventrality of the chromosomes as an explanation for the phenomena of pairing. The fact that the chromosomes divide transversely is regarded as supporting the view that the chromosome is a single entity and not a string of genes. Several observations are cited, which indicate that pairing results from the attraction between whole chromosomes, not between their individual parts.

124. Swanson, C. P. 576.312.341:576.354.4
The behavior of meiotic prophase chromosomes as revealed through the use of high temperatures.
Amer. J. Bot. 1943 : **30** : 422–28.
Meiotic prophase configurations in *Tradescantia* spp. have been examined cytologically after high temperature treatment. Spiralization occurs either before or during chromosome pairing and the lengthening of the chromosomes in leptotene and their subsequent shortening can be correlated with the degree of coiling of the chromatids. Since the latter coil independently of each other before chiasma formation, considerable uncoiling of the relational coils of the chromatids must occur before zygotene.
The fact that coiling and chiasma formation occur simultaneously suggests that the torsion produced by despiralization may be one of the causes effecting crossing-over.

125. 576.312.35:581.04
Sanguinarine rivals colchicine.
40th Ann. Rep. S. Dak. St. Hort. Soc. 1943 : p. 74.
Sanguinarine has been successfully used for doubling the chromosome complement of *Antirrhinum* sp. (Cf. "Plant Breeding Abstracts", Vol. XIII, Abst. 458).

126. Vilkomerson, H. 576.312.35:581.1:635.659
Chromosomes of *Astragalus*.
Bull. Torrey Bot. Cl. 1943 : **70** : 430–35.
A correlation between chromosome number and selenium absorption is reported for the genus *Astragalus*.

127. Castro, D. de 576.312.381:581.04:633.526.2
Nota àcêrca da acção da colquicina sôbre o centrómero. (**Note on the action of colchicine on the centromere**).
Agron. Lusitana 1942 : **4** : 61–70; also Rev. Agron. Lisboa 1942 : **30** : p. 460.
Inflorescences of *Aloe arborescens* L. were treated with 1% solutions of colchicine. The chromatic condensation caused by the colchicine made the centromere more obvious than in untreated material; it seemed to be surrounded by a mass of matrix which prevents its normal functioning.

128. Guinochet, M. 576.353:581.04
Sur quelques modifications des réactions physico-chimiques de la cellule végétale, provoquées par les substances mito-inhibitrices. (**On some modifications of the physico-chemical reactions of the plant cell caused by substances inhibiting mitosis**).
C.R. Acad. Sci. Paris 1940 : **210** : 579–80.
The author suggests that the effect of colchicine and similar substances is achieved by a modification of the physico-chemical reactions of the cell leading to physiological disturbances of the nucleus. R. M. I.

129. Ryan, F. J. 576.354.4:632.421.9
Crossing-over and second division segregation in fungi.
Bull. Torrey Bot. Cl. 1943 : **70** : 605–11.
The author analyses the genetical data published by Zickler on *Bombardia* and Wülker on *Neurospora*. He concludes that the usually accepted theory of meiosis, with single or double crossing-over in the first division, will cover these two cases and that it is unnecessary to postulate a division of the centromere before meiosis II.

576.356:537.531
130. Giles, N. H. (jun.) 576.356:539.185.9
Comparative studies of the cytogenetical effects of neutrons and X-rays.
Genetics 1943 : **28** : 398–418.
A linear relationship exists between the dose of neutron irradiation and the frequency of chromosome interchange, interstitial deletion and the incidence of chromatid aberrations. No intensity effect could be demonstrated for chromosome or chromatid re-arrangements. Neutron particles with lower energies are more efficient in producing breakages in chromosomes and probably in chromatids.

The differences between the activities of X-rays and neutron streams are discussed. It is concluded that X-rays act via the production of secondary electrons which themselves give rise to scattered ion pairs distributed along a sinuous path. Neutrons are believed to effect the release of recoil protons which have much shorter paths than the electrons but produce a high local density of ionization. In the light of these conclusions, neutrons are supposed to bring about an exchange by the mediation of two events produced by the same proton path, an explanation which accords with the linear relationship observed between neutron dose and aberration frequency. Electron chromosomal effects, on the other hand, require the simultaneous occurrence of two events produced by two different electron paths and consequently, the frequency of aberration is proportional to the square of the dose.
This explanation also covers the greater relative efficiency of neutrons with lower energy levels and the higher efficiency of neutron irradiation in general when compared with X-radiation.
The importance of the space factor is also discussed.

131. Brumfield, R. T. 576.356:635.25:537.531:581.04
Effect of colchicine pretreatment on the frequency of chromosomal aberrations induced by X-radiation.
Proc. Nat. Acad. Sci. Wash. 1943 : **29** : 190–93.
The author has investigated the effect of colchicine on the frequency of X-ray induced chromosome aberrations in *Allium*. He concludes that the number of aberrations induced in resting nuclei is unaffected by a previous treatment with colchicine but that the frequency in dividing nuclei is considerably reduced. These results are held to support the theory that aberration frequency is correlated with the degree of chromosome movement.

132. Bergner, A. D. 576.356.2:576.16
Chromosomal interchange among six species of *Datura* in nature.
Amer. J. Bot. 1943 : **30** : 431–40.
The role played by segmental interchange in the evolution of species is discussed with reference to the genus *Datura*.

133. Wada, B. 576.356.5:576.312.381:581.04
(Effects of colchicine on dividing cells. Atraktosom-figures in somatic cells).
Jap. J. Genet. 1941 : **17** : 32–34.
From a study of the effects of colchicine on somatic division in *Tradescantia* the writer found that though it appears to reduce surface tension in the spindle, the other factors in division and the vitality of the cell remain unaffected.
The action of colchicine on the spindle substance is reversible and when the colchicine is eliminated the spindle recovers its function though the divisions may show aberrations. On the other hand, as long as colchicine persists in the cell, the various division processes in which chromosomes and spindle participate are repeated at every nuclear division and a high degree of polyploidy results.

134. Simonet, M. and
Igolen, G. 576.356.5:581.04
Obtention, sous l'influence de vapeurs d'essence de petit grain mandarinier, d'effets comparables à ceux exercés par la colchicine sur les caryocinèses végétales. (**Effects, obtained by the use of the vapour of the essential oil of mandarin seeds, comparable to those of colchicine on karyokinesis of plants**).
C.R. Acad. Sci. Paris 1940 : **210** : 510–11.
Methyl methylanthranilate contained in mandarin seeds was found capable of exerting an effect comparable to colchicine on cell division in roots of flax and barley. R. M. I.

135. Tschermak, E. 576.356.5:581.04:578.08
Durch Colchicinbehandlung ausgelöste Polyploidie bei der Grünalge *Oedogonium*. (**Polyploidy in the green alga *Oedogonium* induced by treatment with colchicine**).
Naturwissenschaften 1942 : **30** : 683–84.
Experiments on seven species of *Oedogonium* showed that it was important that the treatment

should be applied while the cells were actually dividing, as polyploidy, in the case of *Oedogonium* diploid nuclei, most probably only occurs when colchicine is applied during metaphase. The cells containing the diploid nuclei were nearly double the size of normal cells. R. M. I.

136. TAYLOR, H. 576.356.5:581.1
A physiological study of diploid and related tetraploid plants.
Proc. Okla. Acad. Sci. 1942 : **22** : 137–38.
A comparative study of the factors affecting the water balance of the plant has been made between diploid and tetraploid representatives of the species *Vinca rosea* and *Petunia violacea*.

137. COOPER, D. C. 576.356.52:633.71
Haploid-diploid twin embryos in *Lilium* and *Nicotiana*.
Amer. J. Bot. **1943** : **30** : 408–13.
Cytological evidence is presented to show that the haploid embryos sometimes found in twin seedlings of *Lilium* and *Nicotiana* arise from synergidae, stimulated to parthenogenetic development by pollination. A single case of a second embryo arising as an epidermal outgrowth from the first has been observed in *Nicotiana rustica*. It is possible that the haploid plants occasionally found in wild populations may arise from synergidae in the way described above.

HORMONES 577.17

138. ZIMMERMAN, P. W. 577.17
Present status of "plant hormones".
Industr. Engng Chem. **1943** : **35** : 596–601.
A list of physiologically active substances which act as hormones is presented; it includes a number of substituted phenoxy and benzoic acids. Details of the plant responses to each of these substances are included.

BIOLOGICAL TECHNIQUE 578

139. WITHROW, R. B. 578.08:001.4
Radiant energy nomenclature.
Plant Physiol. **1943** : **18** : 476–87.
A scheme is presented for the standardization of terms relating to radiant energy.

140. SEMMENS, C. S. 578.65
Nucleolar stain and nucleal reaction.
Bot. Gaz. **1943** : **104** : 645–49.
The author outlines the principles on which the technique, introduced by Semmens and Bhaduri, for differentiating nucleoli from chromosomes is based. Criticisms against its usefulness are answered.

BOTANY 58

141. CROIZAT, L. 582:001.4
What is the trinomial *typicus*?—II.
Bull. Torrey Bot. Cl. **1943** : **70** : 406–17.
The author continues the arguments of a previous paper and concludes that proposals recently made to amend the existing Rules of International Nomenclature with regard to trinomials are unacceptable.

INTRODUCTION OF NEW SPECIES 631.524

142. 631.524:001.4
PINTO DA SILVA, A. R. 633.49:575(46.9)
Um aspecto da etnobotanica Portuguesa: os nomes vernáculos das plantas.
(**An aspect of Portuguese ethnobotany: vernacular plant names**).
Rev. Agron. Lisboa **1942** : **30** : 376–79.
The author points out how much can be learned from local inhabitants and local names. For instance *Crepis bulbosa* is called "batatinha brava" [wild potato] in Portugal and is eaten by pigs: it may be susceptible of improvement by breeding.

143. Quintanilha, A. 632.4:576.16
O problema da delimitação e origem das espécies do ponto de vista da biologia experimental. (**The problem of the delimitation and origin of species from the point of view of experimental biology**).
Rev. Agron. Lisboa 1942 : **30** : p. 473.

The important part played by isolation in the formation of species is mentioned. In the Hymenomycetes incompatibility has been observed between haploids of different provenance.

144. Keitt, G. W.,
Langford, M. H. and
Shay, J. R. 632.421.9:575.242:575.11
***Venturia inaequalis* (Cke.) Wint. II. Genetic studies on pathogenicity and certain mutant characters.**
Amer. J. Bot. 1943 : **30** : 491–500.

The theory is developed that pathogenicity in *V. inaequalis* is determined by a series of allelomorphic genes which differ *inter se* in their pathogenic capacities. Hybridization experiments with the two mutants, "tan" and "non-conidial", have demonstrated that these two mutants do not involve the pathogenic locus but suppress the expression of pathenogenicity.

145. Hansen, H. N. and
Synder, W. C. 632.421.9:575.242:575.113:581.162.5:577.8
The dual phenomenon and sex in *Hypomyces solani* F. *Cucurbitae*.
Amer. J. Bot. 1943 : **30** : 419–22.

The C (conidial) and M (mycelial) types of *Hypomyces solani* f. *Cucurbitae* have been shown to differ by a single gene. Type M frequently arises from type C by mutation but the reverse change has never been observed. The C form is "monoecious", bearing both male and female gametangia but is self-sterile, two compatibility groups, determined by a single gene pair, being recognized. In contrast to this, the M mutant can function only as a male. None of the genes pairs studied in this paper viz.: *C*, *M* (conidial ♀, mycelial ♂); *A*, *a* (compatibility genes); and *R*, *W* (red and white perithecial colour), are linked. It is pointed out that sex type and compatibility are inherited independently and that the terms "monoecious" and "dioecious" can be applied with advantage to haploid thalli.

146. Zirkle, R. E. 632.422.3:537.531
Significant differences in X-ray sensitivity among various species and strains of yeasts.
J. Bact. 1942 : **43** : p. 119.

Considerable differences with regard to X-ray sensitivity have been observed between and within species of the genera *Zygosaccharomyces*, *Torulopsis* and *Saccharomyces*.

147. Lindegren, C. C. 632.422.3:575.242:575.12
Genetics of yeast.
J. Bact. 1942 : **44** : p. 623.

An exceptionally unstable yeast, producing many mutants, was obtained from crossing a very stable and a relatively stable form of *Saccharomyces*.

148. Góis, A. and
Correia, E. M. 632.422.3:576.16:575.42
Influência da raça da levedura (*S.** *ellipsoideus*) como elemento a considerar na correcção da concentração hidrogeniónica dos môstos. [**Influence of the race of yeast (*S. ellipsoideus*) as a factor to be considered in correcting the hydrogen ion concentration of musts**].
Rev. Agron. Lisboa 1942 : **30** : p. 445.

Studies of different races of this yeast have shown marked differences in amount of tartar produced. This factor alone is sometimes sufficient to effect all the correction required and selection of desirable races is recommended.

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* [*Saccharomyces.*]

149. BAUCH, R. 632.422.3:576.356.5:581.04
Experimental mutation-selection of yeast by means of chemical substances.
Woch. Brau. 1942 : **59** : 1–7, 9–11. [From Chem. Abst. 1942 : **36** : 6573].
The effect of camphor, acenaphthene, and α-naphthylamine on yeast cells has been investigated. Cell enlargement and new morphological types have been obtained especially through the use of camphor. It is concluded that tetraploid, hexaploid, octoploid and aneuploid races have arisen. Some of these differ markedly from the parent material in the taste they give to beer.

150. KALLÓS-DEFFNER, L. 632.422.3:615.37:578.088
Zur serologischen Differenzierung von Hefearten. (**Serological differentiation of yeast species**).
Ark. Bot. 1942 : **30**B : No. **1** : 1–2.
A serological technique is described by means of which baker's yeast can be distinguished from brewer's yeast. Both are referred to as *Saccharomyces cerevisiae* but the results indicate a genetical difference between the two and the presence in the brewer's yeast of at least one antigen not present in baker's yeast. R. M. I.

151. MARTIN, W. J. 632.451:576.16:575.127.5:633.2
A study of the genetics of *Sorosporium syntherismae* and *Sphacelotheca panici miliacei.*
Phytopathology 1943 : **33** : 569–85.
Both *Sorosporium syntherismae* and *Sphacelotheca Panici miliacei* exist in numerous strains and this number is increased by the mutants that appear in culture. The former species attacks a number of grasses but the latter is confined to *Panicum miliaceum.* A hybrid is formed readily between the two species but less than 10% of the F_1 sporidia are viable. Verrucose spore walls are dominant to smooth and are determined by a single gene; size of spore appears to be inherited independently of the type of marking.

152. OLIVEIRA, B. d'. 632.452:575.12
A fase aecidica e o heterotalismo na *Puccinia anomala* Rostr. (**The aecidial phase and heterothallism in *P. anomala* Rostr.**).
Rev. Agron. Lisboa 1942 : **30** : 460–61.
The fungus is shown to be heterothallic. The aecidial stage, though not found naturally in Portugal, has been produced artificially.

153. OLIVEIRA, B. d'. 632.452:576.16:633.1(46.9)
Da necessidade de intensificação do estudo das raças fisiológicas das ferrugens dos cereais na Peninsula. (**The necessity for intensifying the study of the physiological races of cereal rusts in Spain and Portugal**).
Rev. Agron. Lisboa 1942 : **30** : 467–68.
The importance of having full information on and collections of physiological forms for the benefit of plant breeders is emphasized.

154. ZAGALO, A. C. 632.483:575.243
Variação do *Coryneum Longistipatatum* Berl. et Bres. (**Variation in *C. longistipatatum* Berl. et Bres.**).
Rev. Agron. Lisboa 1942 : **30** : p. 461.
Some variants proved to be dauermodifications and others true mutants.

155. THOMAS, H. R. 632.484:576.16
A nonchromogenic sporulating variant of *Alternaria solani.*
Phytopathology 1943 : **33** : 729–31.
A strain of *A. Solani* is described which does not colour agar but sporulates profusely.

156. WELLMAN, F. L. 632.484:576.16:578.08
A technique to compare virulence of isolates of *Alternaria solani* on tomato leaflets.
Phytopathology 1943 : **33** : 698–706.
A technique for estimating the virulence of isolates of *A. Solani* is described.

157. Woods, M. W. and
DuBuy, H. G. 632.8:576.12:575.061.633
Evidence for the evolution of phytopathogenic viruses from mitochondria and their derivatives. I. Cytological and genetic evidence.
Phytopathology 1943 : **33** : 637–55.

Evidence is presented in support of the theory that viruses have originated during evolution from chondriosomes. The spontaneous origin of variegated strains of several species has been observed and these and other variegated plants can be arranged in a series exhibiting increased derangement of the normal cell physiology, the more extreme types resembling closely the effects of virus infection.

It is suggested by the authors that the chondriosomes found in variegated patches may invade neighbouring cells by intercellular penetration after which they inhibit the normal development of the plastids. The data on which this theory is based include the mode of distribution of heterochondric cells, the varying degrees of inhibited plastid development found in these cells, and the fact that some of the variegations exhibited by these plants have been transmitted by grafting. If this suggestion is accepted, a close parallel to the movement of viruses in the plant may be drawn.

Matroclinous inheritance is a third characteristic in which variegations resemble some types of virus.

158. Wada, E. and
Fukano, H. 632.8:576.16:633.11–1.521.6(52)
(The existence of strains in yellow mosaic virus.)
Pl. Breed. News 1936 : 2697–702.

As a result of observations on differences in resistance to yellow mosaic in two Japanese wheats when each was grown in two different districts, experiments were made with nine Japanese varieties grown on soil from ten different localities to study their mosaic reaction. The authors are inclined to conclude that the soils contained distinct strains of the virus and that the wheat varieties differ in their resistance to them; this finding would be important for wheat breeding.

159. Hansberry, R. and
Lee, C. 632.951.1
The yam bean, *Pachyrrhizus erosus* Urban, as a possible insecticide.
J. Econ. Ent. 1943 : **36** : 351–52.

The possible use of yam bean as an insecticide is suggested. Considerable variation in the toxicity of different individual plants is to be expected and there is evidence to suggest that the toxicity is not primarily attributable to the rotenone content, which was low in all the samples analysed.

160. Razdorskaja, L. A. 632.951.1(47)
(The introduction of insecticidal *Tephrosiae* in the U.S.S.R. A preliminary communication).
Sovetskaja Botanika (Soviet Botany) 1941 : No. 5–6 : 68–78.

This is an account of the first year's work with 14 individual plants belonging to 8 species of *Tephrosia* at the State Farm "Picunda" in the Abhaz autonomous S.S.R. (S.W. Transcaucasia). The seed material, apparently of African origin, was received in 1940 from the Medicinal Herbs and Plants Division of the Institute of Plant Industry. Experimental plot trials were conducted with *Tephrosia Vogelii, T. virginiana, T. grandiflora, T. macropoda, T. candida,* and *T. rigida,* but in this paper the details are given only on the biology of the first species; several other types were analysed to determine the yield and toxicity of the rotenone compound contained. *T. Vogelii* gave a yield of green matter from 45 to 70 tons per ha. The accumulation of the rotenone compound reached its peak towards the end of the vegetative period in November; all parts of the plant contained the rotenone complex, the maximum being found in the leaves, the cortex of the stems, the decorticated stems and the roots contained progressively less. A limited number of experiments showed the possibility of vegetative propagation of the plant. Of the other types, *T. candida, T. rigida* and *T. grandiflora* also grew and developed well in the humid sub-tropics. Further tests with *T. toxicaria, T. cinerea* and those enumerated above were to be carried out in 1941. Similar work has been conducted with other rotenone-bearing plants such as *Mundulea,* and different species of *Derris* and *Lonchocarpus.* H. F.

161. KOUDRIACHOV, S. N. 633–1.524(47)
(Plant resources of Uzbekistan).
J. Bot. U.R.S.S. 1942 : **27** : 109–16.

The great wealth of forms of fruit and nut trees found growing wild in Uzbekistan is once more enlarged upon; there are 50 different forms of apple, many high quality types of myrobalan, some having fruits as large as an ordinary plum, and an extraordinary range of walnut types and an abundance of pistachio and wild almond (*Amygdalus spinosissima*). Other valuable plants of the region include wild sugar cane, several species of *Rosa* with high vitamin C content, wild safflower (*Carthamus Oxyacantha*) and other oil bearing plants, many wild plants containing tannin and dyes, *Psoralea drupacea* and other fibre plants, *Erianthus* and other plants for paper making and teke-saghyz (*Scorzonera acanthoclada*), which, though inferior to kok-saghyz and krym-saghyz, can also be used for rubber production.

162. ÅKERMAN, Å. 633–2.111–1.521.6:575(48.5)
Tre års erfarenheter rörande våra åkerbruksväxters vinterhärdighet.
(Three years' experiments on the winter-hardiness of our agricultural crops).
Sverig. Utsädesfören. Tidskr. 1942 : **52** : 291–305.

That wheats exist that can withstand the severest winters was made clear from the outstanding performance of the Swedish land wheat Sammets as compared with Solvete I and Standard in 1940–41. On account also of their good baking quality and disease resistance Swedish land wheats have been used to breed lines, some of which (from a Halland wheat) are nearly as winter hardy as Sammets. Other varieties with good winter hardiness are Thule III, Pärl and Gluten, the last named being also early ripening and outstanding in baking quality; unfortunately, however, it cannot stand drought as well as other varieties.
The several methods and varieties used in crosses to produce new hardier wheats are enumerated.
High yielding and high quality varieties equal to Gluten in hardiness are the breeder's present objective and varieties of this kind selected both by freezing experiments and by their performance during the winter of 1939–40 are now being multiplied.
Among the promising forms, many of which are now undergoing their trial, are: some lines from Äring I x Skandia I, Äring I x Stål and Kron x Bore II; some hybrids from crosses of low yielding bred varieties such as Jarl, Svea II, Gluten, Vrm 01139 and the highest yielding Southern Swedish varieties; crosses with the hardy land wheats including No. 01331, a cross of the Halland land wheat with Skandia, and a central Swedish land wheat hybrid, Ög 33/525 (from Bore I x Sammets); and finally crosses with foreign varieties of outstanding winter hardiness such as Vg 01312 (from Ankar I x 01200) which was obtained from the Hard Winter (a variety from the U.S.A.) x Pansar III.
The performance of numerous varieties in trials and their suitability for different districts of the country are discussed.
In order to insure a wider range of conditions in testing new varieties, more intimate co-operation between the Association and the Agricultural Research Institute has now been established.
The Norrland and Finnish land ryes are the main stock for breeding rye for hardiness.
Nilsson-Ehle is to report on winter barley
The recent severe winters confirmed the fact that turnip rape is on the whole hardier than rape; there were specially hardy lines from a turnip rape strain from Vilna. One rape from the Ukraine was very winter hardy but another even hardier line was found among plants of Wilnensis turnip rape. If these extremely hardy lines pass their next tests they are to be used in crosses to produce rape varieties hardy enough for the whole of Götaland.
Nilsson-Leissner reported on the work on winter-hardiness of herbage plants. In future more attention must be paid to this problem in breeding these plants.
Work on root crops was reviewed by Olsson (cf. Abst. 229).

163. PAINTER, R. H. 633–2.7–1.521.6
Insect resistance of plants in relation to insect physiology and habits.
J. Amer. Soc. Agron. 1943 : **35** : 725–32.

The author discusses the nature of resistance to insect pests with special reference to the habits and physiology of the insects.

164. HADDON, C. B. 633.00.14(76.3)
Biennial report of the Northeast Louisiana Experiment Station 1941–42 : Pp. 40.

Varietal tests are reported for the following crops: cotton, maize, oats, wheat, barley and soya beans.

CEREALS 633.1

165. 633.1:537.531:576.356.2:575.242
SMITH, L. 633.1:581.036.1
Relation of polyploidy to heat and X-ray effects in the cereals.
J. Hered. 1943 : **34** : 131–34.

The effects of heat and X-ray treatments on dormant seeds taken from a polyploid cereal series, which included wheat, oats, rye, barley, maize and a *Triticum* x *Aegilops* amphidiploid, are described. Heat tolerance was found to be independent of chromosome number and heat treatment to be ineffective as a means of accelerating the mutation rate or inducing chromosomal aberrations. Injury by X-ray irradiation decreases with the higher polyploids and the combined effect of heat and X-ray treatments is described. X-rays increase the frequency of mutation, the number of chromosome bridges in somatic cells and the number of reciprocal translocations observable in meiosis. The frequency of translocation in irradiated pollen increases considerably with increase in the number of chromosome sets.

166. SUNDELIN, G. and 633.1:575(48.5)
ELIASSON, S. 633.1.00.14(48.5)
Den lokala sortförsöksverksamheten. I. Sammanställningar av resultaten av sortförsöken med höstsäd under åren 1929–1938. **(Local variety trials. I. Survey of the results of autumn sown grain variety trials in 1929–1938).**
Medd. Lantbrukshögskolan Jordbruks. 1940 : No. 3 : Pp. 131.

SUNDELIN, G. and
ELIASSON, S.
Den lokala sortförsöksverksamheten. II. Sammanställningar av resultaten av sortförsöken med vårstråsäd under åren 1929–1939. **(Local variety trials. II. Survey of the results of spring sown grain variety trials in the years 1929–1939).**
Ibid. 1941 : No. 5 : Pp. 216.

These two detailed reports on the performance of different varieties of wheat, rye, barley and oats in trials in various parts of Sweden include genealogical tables for autumn and spring wheats showing the origin of certain varieties.

167. CHANG, S. C. 633.1:581.142:581.143.26
Length of dormancy in cereal crops and its relationship to after-harvest sprouting.
J. Amer. Soc. Agron. 1943 : **35** : 482–90.

Varietal differences in after-harvest sprouting have been investigated. In general, there is a negative correlation between frequency of sprouting and the length of the dormancy period. The wheat varieties Mindum and Kubanka are exceptional however and have a high sprouting resistance in spite of ready germination. It is recommended that cereals without a dormancy period should not be introduced into regions where after-harvest sprouting is a problem.

168. JOHNSON, I. J. 633.1–2.45–1.521.6:575.127.2
Recent advances in applied plant genetics.
Proc. Iowa Acad. Sci. 1941 : **48** : 59–63.

The author reviews some of the recent advances in plant breeding, taking as his example the production of disease resistant cereal varieties. Thatcher, a wheat resistant to stem rust, was obtained from the interspecific cross *Triticum vulgare* x *T. durum*. The varieties, Hope and H-44, also resistant to rust, were obtained from *T. vulgare* x *T. dicoccum*. In these cases, resistance is inherited as a simple Mendelian dominant factor.

Oat breeding has profited from the use of the disease resistant variety Victoria. Stem rust resistance in oats is determined by a single dominant factor, while crown rust and smut resistance depend on either one or two factors according to the variety used. Loose and covered smut reactions are controlled by the same genes.

169. Åkerman, Å.,
Jakobsson, J. and
Lindberg, J. E. 633.1:664.641.016(48.5)
Undersökningar av kvaliteten hos 1941 års brödsädesskörd. (**Investigations of the quality of the bread cereal harvest of 1941**).
Sverig. Utsädesfören. Tidskr. 1942 : **52** : 306–42.
A detailed account is given of the official tests of the quality of bread cereal samples from the 1941 harvest in Sweden, carried out by the cereal laboratory of the Swedish Seed Association.

WHEAT 633.11

170. Câmara, A.,
Castro, R. and
Almeida, J. M. 633.11:575(46.9)
Problemas de selecção dos trigos. (**Problems of breeding wheat**).
Rev. Agron. Lisboa 1942 : **30** : 470–71.
Owing to the complex heterozygosity of most of the characters required by the breeders, the method of successive back-crossing to the most desirable type is recommended.

171. 633.11:575"793"(48.5)
Åkerberg, E. 633.11–2.111–1.521.6(48.5)
Resultat från 25 års försök med höstvete vid Sveriges Utsädesförenings Västernorrlandsfilial. (**The results of 25 years of experiments with autumn wheat at the Västernorrland Branch Station of the Swedish Seed Association**).
Sverig. Utsädesfören Tidskr. 1943 : **53** : 32–47.
The early trials with autumn wheat, and with rye, and the trend of development in the cultivation of this crop since 1916 in Västernorrland are recorded. The object of the wheat trials was to find out the best varieties for the region and to study the winter-hardiness of varieties not only for the area but also with a view to autumn wheat breeding for central Sweden; and practically every year Professor Åkerman ran trials of winter-hardiness of large numbers of varieties at the Branch Station. Tests of commercial varieties for winter-hardiness (which in these experiments included cold hardiness, resistance to frosts, to drying and freezing during spring and to diseases) resulted in some interesting data showing a very good agreement between the winter-hardiness and the relative sugar content in Sammets wheat (0700), Thule II and Svea II. Sammets was quite unequalled in winter-hardiness; among the other varieties with comparable testing periods, Thule III came next; Jarl, which did badly, apparently improved in later trials. The performance of this group of wheats in regard to type of grain, strength of straw, ripening time and baking quality is given in detail and for various localities. For increased yields in such a northerly region as Västernorrland, varieties superior even to Sammets in winter-hardiness are needed and several land varieties from Värmland, Västernorrland, Närke and Gästnikland were tested. In trials up till 1931, the Gästnikland wheat gave good yields and was satisfactory as regards winter-hardiness; it should be revived again for further trials.
Among the land wheats U 35/126 appears to be definitely more hardy than Sammets and of value for hybridization. A few other lines, two from Elvesta land wheat and one from Sammets, proved more winter-hardy and higher yielding than Sammets in their first trials in 1941. Other land wheats similarly superior to Sammets were included in Åkerman's special over-wintering trials.
An account is also given of the history and performance of many unnamed hybrid varieties produced at various Branches, including varieties not put on the market or not yet ready for release, e.g. U.01250, Vrm 32/82 (from Svea x 0760), Å22/63 (from Thule II x a land wheat) and Å36/225 (from 0700 x Bore I). The first two excelled Sammets in winter-hardiness and in yield and though Vrm 32/82 is too weak in the straw it will probably be very useful as material for hybridization.

172. Åkerman, Å. and
Fröier, K. 633.11:575"793"(48.5)
Vårveteodlingen i Sverige—dess utveckling och framtidsutsikter. (**Spring wheat cultivation in Sweden—its development and future prospects**).
Sverig. Utsädesfören. Tidskr. 1943 : **53** : 4–12.
In tracing the reasons for the great increase in spring wheat cultivation in Sweden since 1886

the contribution of Swedish plant breeding (e.g. at Svalöf and Alnarp) towards promoting the growing of this crop is outlined by reference to the origins and production of well-known wheats such as Extra Kolben, Extra Kolben II and Ä23/8.
In 1942 the new spring variety 01035, from a cross between Ä23/8 and Extra Kolben II, was put on the market as Progress. It was to replace Extra Kolben II which it surpassed in grain yield and strength of straw, almost equalling Weibull's Atle in the latter respect. In the quality of its grain and in baking quality it is also highly rated. From hybridization between autumn and spring wheat, Svalöf Blank, a spring wheat, a very high yielding and stiff-strawed variety, was obtained which, however, being white grained and possessing too rapid a rate of germination, is not suitable for the Swedish growers, though in Belgium, Holland and other countries it has been well received.
Atle spring wheat, on the market since 1936, was also obtained from crosses between spring and autumn forms; it combines high yield with very good strength of straw but being relatively late ripening its range is confined to suitable coastal regions of the most southerly parts of Sweden.
The problem of supplying spring wheats suitable for inland and higher lying districts of southern Sweden, for Central Sweden and parts of southern Norrland was also included in the breeding programme and resulted in the production of Svalöf Rubin (1921–25), Svalöf Diamant (1928), from a cross between the Halland land spring wheat and Svalöf Kolben, and Svalöf Fylgia (1934), from Aurore and Extra-Kolben I, which, given favourable conditions, is one of the best yielders in the same group as Diamant for earliness; it has also strong straw and good hectolitre weight, but it has certain defects in its baking qualities. Another new Svalöf production is Diamant II (1938) which is rapidly replacing the old Diamant and to which it is definitely superior in gluten quality, probably owing to its Extra-Kolben II ancestry.
With the present intensification of spring wheat breeding and the successes already attained, even better forms, and more reliable as regards yield, should be produced for the proposed increased Swedish acreage under this crop.

173. Åkerman, Å. 633.11:575.12"793"(48.5)
Försök till stegrande av vårvetets avkastning. I. Korsningar med Brunt Schlanstedtervårvete jämte beskrivning av Svalöfs Progressvårvete. **(Experiments to increase the yield from spring wheat. I. Crosses with Brunt Schlanstedter [Brown Schlanstedter]* spring wheat with a description of Svalöfs Progress spring wheat).**
Sverig. Utsädesfören. Tidskr. **1943 : 53 : 51–66.**

Some results of early work on spring wheat breeding in Sweden are outlined with particulars of the origin and characteristics of Brunt Schlanstedter. Crosses between this wheat and Vårpärl [Spring Pearl] showed that each contained a different factor for the spring habit and a similar difference was later found to exist between Brunt Schlanstedter and Svalöfs Kolben and two Kolben varieties, Extra-Kolben I and Extra-Kolben II. The spring factor in Svalöfs Kolben was termed S_k S_k and that in Brunt Schlanstedter S_s S_s, the genetic formulae for spring habit in these two wheats, respectively, being therefore $S_kS_ks_ss_s$ and $s_ks_kS_sS_s$. Other wheats also believed to carry only S_k were Svalöfs spring wheat No. 0201, Extra Kolben I and II, No. 0844, and No. 0942 which was obtained by back-crossing Extra-Kolben I and Svalöfs Kolben. Another wheat, Noë, of the Bordeaux type, was included in crossing experiments at Svalöf and proved also to be a carrier of S_sS_s.
The S_s factor also appears to occur, but with S_k, in lines from some Swedish and Norwegian spring land wheats, Dala spring wheat, Halland wheat and Börsum spring wheat, and derived varieties such as Rubin and Diamant I. Aurore and Marquis have also been proved to be bi-factorial for habit; Marquis is known to carry S_k but its second factor for spring habit may be not S_s, but possibly some third factor not yet identified. That a third spring factor actually exists was evident from the F_2 segregation in a cross between Master (from Canada) and Kron. This will be discussed later. All the spring wheats in these investigations that were bi-factorial or tri-factorial for habit ripen very early and this correlation between the number of spring factors and time of maturity suggests an explanation of the considerable

* A wheat of the Bordeaux type.

transgression (5–6 days) in earliness often found in crosses between Brunt Schlanstedter and varieties of the Kolben type.

Earlier findings on polymeric spring wheat factors are reviewed.

Among a new (01010) series of wheats derived from hybridizations between Extra-Kolben I or No. 0844 and Brunt Schlanstedter, Nos 01010–01012 (from Extra-Kolben I x Brunt Schlanstedter) and especially 01015 (from Brunt Schlanstedter x 0844) surpassed Extra-Kolben II in yield. No. 01015 has however had to be crossed with stiff-strawed varieties to improve its standing capacity.

In the course of Nilsson-Ehle's work at Åkarp to produce an early ripening spring wheat with increased yield strain, Ä 23/8 was bred from a cross between Svalöfs Kolben and Brunt Schlanstedter; it equalled Kolben in earliness while surpassing it in yield by 8% at Svalöf and 47% at Åkarp. Ä 23/8 had a suitable growing period for the most southerly parts of Sweden and also short stiff straw. The grain was large and plump, but the protein content was relatively low and the baking quality too poor.

On crossing Ä 23/8 with Extra-Kolben II there was no segregation for spring *v.* autumn habit in the F_2, so Ä 23/8 probably also carries S_k. Some of the F_3 lines showed specially good straw strength, moderately early maturity and attractive grain quality. As the different F_2 progenies were segregating for grain colour and also to a marked degree for straw length, type of ear, time of ripening, etc., selection was again made in the F_5 and from the progeny 8 plants were chosen for further trials. In 1933 the best lines again underwent selection and the resulting lines were put on the market as Progress spring wheat. This variety is as early as Extra-Kolben II and a little earlier than Atle spring wheat. It surpasses both in yield and has a good stiff straw like Atle and can be harvested by binders. Its grain quality is very good and the size of the grain considerably larger than Atle though its hectolitre weight also is high. The baking quality is up to standard and gluten quality good. Its morphological features are described together with a note on its suitability to certain parts of the southern Swedish coastal districts.

174. Akihama, K. 633.11:581.142:575(52)
(Varietal differences in the maturity of wheat seeds).
Pl. Breed. News 1936 : 2937–42.

The period required for post-harvest ripening of wheat grains is a varietal character. Observations on 135 varieties of wheat showed that as the length of the post-harvest period was increased by storage the speed of germination also increased.

In a survey of the most popular wheat varieties all over Japan it was found that, as grains with the early ripening character tend to germinate during harvest if it rains, more varieties with late maturing grain are distributed in the south-west where rain is likely to occur during the harvest season.

Australia and America in which the rainfall during harvest is slight have a large number of varieties with rapidly ripening grains.

The quality and colour of the grain of some of the different varieties is shown in tabular form.

175. Quisenberry, K. S. 633.11–2–1.521.6:581.6:575
New wheats of the future.
Grain Feed J. 1943 : 88 : 346–47.

A breeding programme for obtaining improved varieties of hard red wheat is outlined. Thatcher, one of the standard spring types, is being replaced by the new varieties Rival and Pilot, but no satisfactory rust-resistant hard red winter wheat has yet been obtained. Other desirable qualities required include resistance to Hessian fly, the high test weight characteristic of Chiefkan and improved baking and milling quality. Vitamin B content appears to be more affected by environmental conditions than by varietal differences and consequently this character is not being included in breeding projects.

176. Kobayashi, M. and Ogihara, T. 633.11–2.111–1.521.6(52)
(Damp and snow-resistance in wheat varieties. Its relation with some other characters).
Pl. Breed. News 1936 : 1775–80.

Though resistance to damp and to snow are not always identical, for the purposes of the experiment they can be considered on the whole as identical.

Twenty-two wheat varieties comprising forms that had both weak and strong resistance to damp or snow were examined in relation to the characteristics of the grain and the young plant, with the following results:—
Resistance was not connected with the water absorption of the grain, but resistant varieties germinate in water more quickly.
There was no correlation between resistance and length or width of the leaf blade of young plants, and almost none between resistance and number of stomata on the first leaf. Nevertheless the ratio of the number of stomata on the upper side of the leaf and on the underside tended to be low in the highly resistant varieties.
Varieties with high resistance all had a higher "dryness percentage" of stem and leaves under normal and abnormal conditions.

177. Holton, C. S. and
Suneson, C. A. 633.11–2.451.3–1.521.6(73)
Wheat varietal reaction to dwarf bunt in the western wheat region of the United States.
J. Amer. Soc. Agron. **1943** : **35** : 579–83.
Varietal resistance of wheat varieties to dwarf bunt has been investigated in five localities. A list of resistant varieties is presented.

178. Kolesnikov, P. 633.11–2.452–1.521.6:575.12
Branches of the Academy of Sciences of the U.S.S.R. II.
Science **1943** : **98** : 231–33.
Intravarietal crosses of winter wheat have been made in Armenia and forms resistant both to yellow rust and stem rust have been produced. Drought resistant fodder varieties are also reported.

179. Jones, E. T. 633.11–2.7–1.521.6:575
Insect resistance in wheat.
J. Amer. Soc. Agron. **1943** : **35** : 695–703.
Five levels of resistance to Hessian fly are recognized in wheat varieties: (*a*) limited local resistance, e.g. Dawson and Kawvale, (*b*) medium resistance, e.g. Marquillo, (*c*) moderately high resistance, e.g. Illinois No. 1 W38, Java, Uruguay selections, and Marvel spring wheats, (*d*) high resistance, e.g. Turkey selections, and (*e*) almost immune strains, e.g. P.I. 94587 *durum* wheat. These sources of breeding material are discussed and the most promising breeding programmes indicated.
Resistant lines have also been reported for the following insects: wheat stem sawfly, wheat stem maggot, grasshoppers, wireworms, the "green grain bug", tipulids, flea beetles, frit fly, wheat midges, wheat joint worm, wheat straw worm, green bugs and chinch bugs. The literature relating to these pests is shortly reviewed.

180. Noble, W. B. and
Suneson, C. A. 633.11–2.7–1.521.6:575.113
Differentiation of the two genetic factors for resistance to the Hessian fly in Dawson wheat.
J. Agric. Res. **1943** : **67** : 27–32.
The bifactorial inheritance of resistance to Hessian fly possessed by Dawson has been confirmed. The two genes, H_1 and H_2, have been isolated from each other by crossing with Poso and subsequent back-crossing. Full resistance was obtained again by recombining the unifactorial lines. These two factors have been successfully conveyed to Big Club.

OATS 633.13

181. Törnqvist, G. I. 633.13:575(48.5)
Svalöfs Samehavre (01341). Ny havresort för nordligaste Sverige. (**Svalöf's "Same" oat 01341 : a new oat variety for northernmost Sweden**).
Sverig. Utsädesfören. Tidskr. **1943** : **53** : 48–50.
The substance of this paper has already been reviewed (see "Plant Breeding Abstracts", Vol. XIII, Abst. 496).

182. Stanton, T. R. and Coffman, F. A. 633.13:576.16(73)
Grow disease-resistant oats.
Fmrs' Bull. U.S. Dep. Agric. 1943 : No. 1941 : Pp. 13.
The following rust and smut resistant oat varieties are described: Boone, Control, Tama, Vicland, Cedar and Vikota (all from Victoria x Richland) and Marion (from Markton x Rainbow).

183. Nishiyama, I. 633.13:576.356.5:575.113.7
(Disturbed segregation ratios caused by certation).
Jap. J. Genet. 1940 : **16** : 300–01.
A study of segregation in the balanced lethal strain discovered in 1931 among the F_3 from an *Avena barbata* ($2n = 28$) x *A. strigosa* ($2n = 14$) cross has shown that this balanced lethal segregates 1 green : 1 albino and on being crossed with normal (*A. strigosa*) (cf. "Plant Breeding Abstracts", Vol. VI, Abst. 1235) it produces two types in the F_1, one early maturing and one normal; the latter segregates in the F_2 into 6 green : 1 albino and in the F_3 into 5 green : 1 albino.
Considerable pollen certation was also recorded and when the balanced lethal was selfed a ratio of

$$8\frac{al\ +\ +}{al\ +\ +} : 9\ \frac{al\ +\ +}{+\ Re\ \lambda} : 1\frac{+\ Re\ \lambda}{+\ Re\ \lambda},$$

where *al* = albino, *Re* = early maturing and λ = lethal, was obtained. Furthermore, when $\frac{Re\ \lambda}{+\ +}$ was selfed (F_3) a plant was found which segregated few normals. In the F_4 and F_5 the ratio of early to normal was 3 : 1 and earliness began to breed true. Fertility was 98% and it is suggested that the gene affecting pollen tube growth and the lethal gene are located close to each other and were lost as a result of crossing-over. (Cf. also "Plant Breeding Abstracts", Vol. IX, Abst. 712).

184. Reed, G. M. 633.13–2.451.2:576.16:631.521.6:575.113
Reports on research for 1940. Plant pathology.
Brooklyn Bot. Gdn Rec. 1941 : **30** : 81–87.
Investigations on the genetics of smut resistance in oats have been continued. Navarro is highly resistant to race 1 of both loose and covered smuts while Hull-less is susceptible to both these forms. Resistance to races 1 and 7 of covered smut is determined by the interaction of three factors but it is unknown at present whether these are identical in the two cases under consideration. Two independent factors control resistance to race 1 of loose smut but resistance to race 12 of the same species is determined by a very different genetic system; only a few resistant progeny could be obtained from crossing.
Several additional smut races have been differentiated, making a total of 15 for covered smut. Gothland and Early Champion are susceptible to all of these; Monarch is resistant to 11 races and susceptible to 4; and Fulghum and Joanette are resistant to them all.
Hybridization experiments are also reported with race 1 of both loose and covered smuts.

185. Reed, G. M. 633.13–2.451.2:576.16:631.521.6:575.113
Reports on research for 1941 : Plant pathology.
Brooklyn Bot. Gdn Rec. 1942 : **31** : 90–94.
A new race of loose smut has been discovered which attacks Victoria oats and hybrids deriving their resistance from this variety. The new race was obtained from Oklahoma and appears to belong to the Fulghum group.
The inheritance of smut resistance has been studied in the cross Navarro x Hull-less. A two factor complex governs the resistance of Navarro to race 1 of loose smut and a three factor complex its resistance to races 1 and 7 of covered smut. A large proportion of the F_2 and F_3 progenies of this cross were susceptible to race 12 of loose smut. In the F_2 and F_3 generations of Navarro x Black Mesdag, five distinct factors determining resistance to two races of covered smut could be distinguished and three factors for resistance to a race of loose smut.
Two factors control the inheritance of resistance to race 1 of loose smut in the cross Navarro x Gothland.

186. Atkins, R. E. 633.13:664.641.016(77.7)
Factors affecting milling quality in oats.
J. Amer. Soc. Agron. 1943 : **35** : 532–39.
Satisfactory milling quality is shown to depend on a low hull percentage and a low percentage of "bosom" kernels. Kernel weight, ratio of primary to secondary kernels and bushel weight are secondary criteria.

RYE 633.14

187. Chin, T. C. 633.14:576.356.5
Cytology of the autotetraploid rye.
Bot. Gaz. 1943 : **104** : 627–32.
The increase in cell dimensions of tetraploid rye over the diploid is described. At meiosis, up to four quadrivalents may be produced and the relation of multivalent frequency to chiasma frequency is discussed. Other irregularities observed include chromosome bridges and lobed pollen grains. Pollen incompatibility was studied for diploid x tetraploid crosses and the reciprocal.

188. O'Mara, J. G. 633.14:576.356.5
Meiosis in autotetraploid *Secale cereale*.
Bot. Gaz. 1943 : **104** : 563–75.
A detailed account is presented of the course of meiosis in autotetraploid rye. The following aberrations have been observed: multivalent association, an asynaptic tendency resulting in the formation of a large number of univalents (this effect being pronounced in aneuploid material), inversion or duplication bridges, univalent bridges, lagging chromosomes, irregular anaphase distributions and chromosome losses. The latter abnormality was frequent and occurred up to six cell generations before the first meiotic division. Reduction in chromosome number sometimes proceeded as far as the original haploid condition and even further so that hypoploid cells were formed. In one case, two cells were observed each having three univalents and one trivalent at meiosis, i.e. deficient for three whole chromosomes. These cells had both been formed mitotically from the parent cell.

MAIZE 633.15

189. Mendes, C. T. 633.15:575
A selecção na cultura do milho. (**Selection in maize growing**).
Bol. Agric., S. Paulo 1939 : **40** : 125–48.
Local varieties of maize have not always proved better than imported varieties, some of which, e.g. Cateto de Piemonte, have given excellent results in Brazil. Various methods of selection are described, and the characters on which selection should be based are enumerated. Since very little breeding work has been done with maize in Brazil, quite marked improvements can still be achieved by mass selection alone. Thus from the variety Santa Rosa, an excellent yielder, but heterogeneous in respect of colour and texture of grain and hence in resistance to weevil damage, an absolutely uniform desirable type was obtained by mass selection. Great improvement is also to be expected from inbreeding, not as a method of producing pure lines but as a means of freeing the populations of undesirable genes, since they are extremely mixed at present. The best results are thought however to be obtainable from the ear-to-row method.

190. Lebedeff, G. A. 633.15:575.12(72.95)
El maiz en la defensa. (**Maize in defence**).
Agric. Exp. P.R. 1941 : **1** : No. 3 : 4–5.
Hybrid maize seed is being produced in Puerto Rico and issued to the growers by the Agricultural Experiment Station of the University.

191. Pinnell, E. L. 633.15:575.12:578.08
The variability of certain quantitative characters of a double cross hybrid in corn as related to the method of combining the four inbreds.
J. Amer. Soc. Agron. 1943 : **35** : 508–14.
The technique of predicting the characters of double cross hybrids of maize from the examination of the single crosses has been investigated. It is concluded that it is "impossible to predict the relative variability of the double crosses on the basis of the means of the non-parental single crosses". Many promising double crosses may have been discarded in the past due to a reliance on this technique.

192. SPRAGUE, G. F. and
SASS, J. E. 633.15:575.242:581.45
Heritable characters in maize: "accessory blade".
Proc. Iowa Acad. Sci. 1942 : **49** : p. 256.

A recessive mutant is described which brings about the formation of blade-like outgrowths from the surface of the leaves.

193. BEARD, F. C. 633.15:581.331.2:576.354.4
The germination capacity of maize pollen having aberrant nuclei.
Bull. Torrey Bot. Cl. 1943 : **70** : 449–56.

The effects of the gene *dv* on the division of the microsporocyte are described. It is shown that the normal morphological organization of the pollen grain is developed even when the chromosome complements of the vegetative and generative cells are each distributed in a number of nuclei. Pollen with a multinucleate vegetative cell is capable of normal germination.

194. ULLSTRUP, A. J. 633.15–2–1.521.6
Diseases of dent corn in the United States.
Circ. U.S. Dep. Agric. 1943 : No. 674 : Pp. 34.

The principal diseases of dent corn are described and cases in which varietal resistance has been demonstrated are noted.

195. WALKER, E. A. and
MAGRUDER, J. W. 633.15–2–1.521.6
Maryland field corn leaf blight disease survey—1942.
Plant Dis. Rep. 1943 : **27** : 126–35.

An account is presented of the susceptibility of maize hybrids and varieties to *Helminthosporium* and bacterial leaf blights observed during an epiphytotic in Maryland. Open-pollinated lines were less damaged than most of the hybrids.

196. BIGGER, J. H. 633.15–2.7–1.521.6:575.12
Insect resistance in corn.
J. Amer. Soc. Agron. 1943 : **35** : 689–94.

The general problems of breeding maize for insect resistance are reviewed. Inbred lines have been obtained resistant to the following pests: European corn borer (resistance probably determined by a complex of genes), second brood chinch bugs, corn leaf aphis, corn earworm, southern corn rootworm, grasshoppers, and probably white grub.

BARLEY 633.16

197. ALMEIDA, J. M. de 633.16:575"793":581.143.26.03
O desenvolvimento da espiga nas primeiras idades, como processo de distinção de formas de inverno e formas de primavera na cevada. (**The development of the ear in the early stages, as a means of distinguishing winter and spring forms in barley**).
Rev. Agron. Lisboa 1942 : **30** : p. 462.

Treatment at +1° C. for 15 days from germination caused an acceleration in development of the growing point in two winter varieties and a retardation in two spring varieties of barley.

198. TEDIN, O. and
ANDERSSON, E. 633.16:575.42:578.08
Urvalsstudier hos korn. (**Selection studies in barley**).
Sverig. Utsädesfören. Tidskr. 1943 : **53** : 98–110.

Using some early data on barley recorded by Tedin at the Institute for Genetics, Lund University, and some later data supplied from Svalöf, the authors analyse the effect of selection on various characteristics, e.g. length of straw, yield, number of ears per plot, weight per ear and 1000 corn weight. In the course of the discussion, the personal factor in selection, the results of increasing or reducing the rigour of selection, and the significance of annual correlations are assessed. The second part of the paper deals with the relation between yield, on the one hand and tillering and size of grain on the other.

199. Andersson, G. 633.16:576.356.5:581.13
Vergleichende untersuchungen der Assimilationsintensität diploider und tetraploider Gerste. (**Comparative experiments on the assimilation intensity of diploid and tetraploid barley**).
Svensk. Bot. Tidskr. **1943** : **37** : 175–99.

Using a strain of Opal B and a tetraploid line produced from it, experiments are described comparing the assimilation intensity and the respiration of the two types.
Tests were made during each week of the growing period and results show that on the whole the intensity of assimilation is greatest in the diploid. Only at one period during July was this position reversed. Growth is quicker in the diploid than in the tetraploid though there was a short time in July when the growth of the tetraploid was greater than that of the diploid.
The individual organs of the tetraploid are for the most part larger than in the diploid, which is probably due to the large size of the tetraploid cells.
Respiration intensity varied little and was about the same in both diploid and tetraploid.

R. M. I.

200. Pope, M. N. 633.16:581.036:581.321.1
The temperature factor in fertilization and growth of the barley ovule.
J. Agric. Res. **1943** : **66** : 389–402.

Experiments designed to investigate the effect of temperature on the growth of ovules of Manchuria barley (*H. vulgare* var. *pallidum*) are described. The optimum rate of pollen tube growth occurs at 30° C.; a very slow growth occurs at 5° C. and no fertilization was effected at temperatures higher than 45° C. It is suggested however that high temperature sterility may be largely due to ovule injury as the thermal death point in this case is 40° C.; optimum growth of both embryos and endosperm occurs at 30° C. Nuclear divisions occur three times more frequently in the endosperm than the ovule, an effect attributed to the extra chromosome set. Van't Hoff's law ($Q_{10} = 2$) holds good approximately for endosperm and embryo divisions between 10° C. and 30° C. but a large rise in the value of the coefficient occurs at lower temperatures.

201. Pope, M. N. 633.16:581.481
Cleavage polyembryony in barley.
J. Hered. **1943** : **34** : 153–54.

Two examples of cleavage polyembryony in barley are described and figured.

202. Caffrey, M. 633.16–1.524:575.12(41.5)
Barley.
J. Dep. Agric. Eire **1943** : **40** : 31–44.

A historical review is given of barley breeding in Ireland. A few of the old local races are still to be found in isolated regions of Wexford, Donegal, Cork and Galway. Spratt-Archer is now the principal Irish barley. Selection 37/6, which was first introduced, has now been replaced by 37 No. 3.
Spratt-Archer has been crossed with the two Danish varieties, Kenia and Maja, and it is hoped that stiff-strawed selections will be obtained from the progeny. It would be desirable if a good Irish 6-row barley could be produced.

203. Freisleben, R. and
Lein, A. 633.16–2.421.1–1.521.6:537.531
Über die Auffindung einer mehltauresistenten Mutante nach Röntgenbestrahlung einer anfälligen reinen Linie von Sommergerste. (**On the discovery of a mutant resistant to mildew in a susceptible pure line of spring barley after radiation with X-rays**).
Naturwissenschaften **1942** : **30** : p. 608.

The experiments were made on a pure line of cultivated barley, of the variety "Haisa" with $2n = 14$ chromosomes.
Among a large number of seedlings from the X_1 progeny inoculated with race 1 of mildew (*Erysiphe graminis*) some were found that were more or less resistant to the disease. Further cultivation and inoculation of the X_2 progeny in the field gave a few completely resistant

plants. The progeny of these were tested with the three mildew races 1, 2 and 4 and proved to be resistant. As far as can be seen these mutants do not differ from the parent line in other respects and they are fully fertile. R. M. I.

204. 633.16–2.484–1.521.6

Barley varieties resistant to stripe, *Helminthosporium gramineum* Rabh.

J. Amer. Soc. Agron. 1943 : **35** : 736–37.

Details of the resistance of barley varieties to *H. gramineum* are presented. It is suggested that the varieties fall into three genetic categories: (*a*) resistant lines with nearly complete dominance, (*b*) intermediate types with incomplete dominance, and (*c*) susceptible types.

205. Immer, F. R. and Christensen, J. J. 633.16–2.484–1.521.6

Studies on susceptibility of varieties and strains of barley to *Fusarium* and *Helminthosporium* kernel blight when tested under muslin tents or in nurseries.

J. Amer. Soc. Agron. 1943 : **35** : 515–22.

Varietal resistance of barley to the blight pathogens *Fusarium* and *Helminthosporium* has been investigated. The regression of susceptibility on date of heading varied from +0·7214 to −7·0868, so that care must be taken in selection to avoid choosing late strains which are not necessarily resistant. In general, varieties resistant to *Fusarium* are also resistant to *Helminthosporium*.

MILLETS AND SORGHUM 633.17

206. Brown, M. S. 633.174:576.356.52

Haploid plants in sorghum.

J. Hered. 1943 : **34** : 163–66.

Two haploid sorghum plants are described. They are highly sterile but occasionally give rise to normal haploid pollen. Ten univalents or occasionally a mixture of univalents and bivalents are found at meiosis. It is suggested that bivalent formation may be an indication that 10-chromosome species of *Sorghum* are polyploid.

207. Koehler, B. 633.174–2.483–1.521.6:575

Disease threatening broom corn production in Illinois.

Plant Dis. Rep. 1943 : **27** : 70–73.

A recent epidemic of disease in broom corn is attributed principally to *Colletotrichum graminicolum*. There is some evidence that varieties and strains differ in their degree of susceptibility; selections have been made.

208. 633.174–2.7–1.521.6:575

Dahms, R. G. 633.51–2.7–1.521.6:575

Insect resistance in sorghum and cotton.

J. Amer. Soc. Agron. 1943 : **35** : 704–15.

Susceptibility of sorghum to chinch bug infection has been investigated by many authors. In general, milo varieties are susceptible while kafirs and sorgo varieties may exhibit considerable resistance. Heterosis frequently confers resistance on the offspring of susceptible parents. It is probable that resistance is a dominant character controlled by one main gene; a complex of subsidiary genes, however, is probably present as well and the genes determining plant growth also affect the degree of resistance.

The possible proximate causes of resistance are discussed.

Resistant lines of sorghum varieties have been investigated also for the following pests: stem borer, grasshoppers, corn leaf aphis, and sorghum midge.

Cotton has been bred for resistance to boll weevil; this problem has frequently been attacked indirectly by producing early varieties which mature before the pest becomes serious. Considerable success has been achieved against leaf hopper infection, as at least one immune variety has been produced. Resistance, in this case, is correlated with the degree of hairiness.

The following pests have also been investigated by plant breeders: boll worm, pink boll worm, cotton stainers, cotton flea hoppers, thrips, black scale, cotton blister mite, cotton aphis, and cotton white-fly.

209. Jodon, N. E. and
Beachell, H. M. 633.18:575.113–181.13
Rice dwarf mutations and their inheritance.
J. Hered. 1943 : **34** : 155–60.

Four different types of rice dwarf are described. The "grassy dwarf", which has appeared independently at Beaumont and Crowley, is determined by a single recessive factor. "Thickset dwarf" behaves similarly when crossed with a normal plant and when crossed with "grassy dwarf" produces normal, "thickset dwarf", "grassy dwarf" and "double dwarf" offspring. These types are only approximately distributed in a 9 : 3 : 3 : 1 ratio.

210. Kondo, M. and
Kasahara, Y. 633.18:582:578.088(52)
(Variety identification of hulled rice kernels by means of the potassium iodide test).
Proc. Crop Sci. Soc. Japan 1941 : **12** : 333–38.

A detailed list is given of the various reactions obtained when the potassium iodide test was applied to the grain of a large number of Japanese and other varieties of rice. The test is recommended for identifying varieties.

FORAGE GRASSES 633.2

211. Blanchard, R. A. 633.2/3–2.7–1.521.6
Insect resistance in forage plants.
J. Amer. Soc. Agron. 1943 : **35** : 716–24.

General points relating to insect resistance in forage plants are discussed and the following examples of resistance noted:—

The potato leaf-hopper causes alfalfa "yellows". A few resistant strains are known, e.g. a coarse stem selection grown at Arlington Farm, Virginia. These resistant types have been little used by plant breeders. The same pest also attacks red clover where resistance appears to be correlated *inter alia* with "rough-hairy" pubescence. Resistant soya bean strains are also distinguished by a similar type of pubescence.

Several lines of alfalfa are resistant to the pea aphis but the nature of resistance is uncertain.

Grasses resistant to chinch bug tend to have "harsh tissue".

Lines of soya bean are known resistant to the Japanese beetle.

The clover seed midge attacks white clover, some lines of which are resistant, but there is evidence to suggest that earliness may be the relevant factor.

Both maturation time and pod toughness have been suggested as proximate causes for the resistance of cowpea strains to the cowpea curculio.

Alfalfa lines resistant to *Lygus* bugs and oat varieties resistant to frit fly are also considered.

212. 633.2/3.00.14(48.5)
633.2/3:575(48.5)
Odlingsvärdet i olika landsdelar av våra viktigaste vallväxtstammar.—Korta översikter. (**Value in different parts of the country of our most important strains of herbage plants—Short surveys**).
Sverig. Utsädesfören. Tidskr. 1943 : **53** : 13–31.

Recommendations for various localities in Sweden of strains of different herbage crops are given, based on many years' comparative trials of stock seed conducted by the Sveriges Utsädesförening at the head and branch institutes. [For further details see Herbage Abstracts].

213. Keller, W. 633.2:581.331.2:578.08
Seed production on grass culms detached prior to pollination.
J. Amer. Soc. Agron. 1943 : **35** : 617–24.

A list of grass species is presented in which pollination and seed production has occurred after cutting the culms and placing them in water.

214. 633.2–1.557(75.6)
A new Bermuda.
Ext. Fm-News 1943 : **28** : No. 11 : p. 3.

Coastal Bermuda, a new variety of Bermuda grass, is recommended for some parts of North Carolina.

215. ROGLER, G. A. 633.2–2.111–1.521.6:576.16(78.4)
Response of geographical strains of grasses to low temperatures.
J. Amer. Soc. Agron. 1943 : **35** : 547–59.

The genotypes of northern races of the species: *Bouteloua gracilis, B. curtipendula, Panicum virgatum* and *Andropogon furcatus*, are more winter hardy than the southern. No significant difference in winter hardiness was found between corresponding races of *Agropyron cristatum, A. Smithii* and *Bromus inermis.*

216. 633.22:575(48.5)
JULÉN, G. 633.22.00.14(48.5)
Nyare försök med hundäxingstammar vid Sveriges Utsädesförening. **(Recent experiments with cocksfoot strains by the Swedish Seed Association).**
Sverig. Utsädesfören. Tidskr. 1943 : **53** : 67–81.

The value of cocksfoot and its breeding and variety trials in Sweden are discussed together with notes on some of the older and more recent varieties and strains. [For further details see Herbage Abstracts.]

217. MYERS, W. M. 633.22:576.356:575
Analysis of variance and covariance of chromosomal association and behaviour during meiosis in clones of *Dactylis glomerata.*
Bot. Gaz. 1943 : **104** : 541–52.

Six clones of *D. glomerata* have been examined cytologically and found to differ significantly in the following characters: number of half-chiasmata per chromosome, average number of quadrivalents per sporocyte, frequency of unpaired chromosomes at metaphase I, frequency of lagging and dividing univalents at anaphase I, and frequency of micronuclei.
Significant positive correlation coefficients were found between chiasma frequency and quadrivalent frequency, metaphase I and anaphase I lagging chromosomes, mataphase I univalents and the number of micronuclei, and anaphase I lagging chromosomes and micronuclei. A negative correlation occurred between chiasma frequency and number of univalents at metaphase I, while no correlation was discovered between quadrivalent frequency and the number of lagging chromosomes at anaphase I.
It is suggested that meiotic aberrations in this species depend principally, not on quadrivalent frequency, but on the number of univalents at metaphase I. Since the differences between the clones appear to be constant and have a genetic basis, selection should be able to produce meiotically regular lines with a high degree of fertility.

218. CUGNAC, A. 633.262:575.127.2:581.46
Réalisation expérimentale d'une variété nouvelle chez une graminée semi-éteinte. **(Experimental production of a new variety in a semi-extinct graminaceous plant).**
C.R. Acad. Sci. Paris 1941 : **213** : 363–65.

The result of a cross between *Bromus secalinus* x *B. arduennensis* is described which has given rise to a new type of *B. arduennensis* without an awn at the apex of the inferior glume. Another successful cross was *B. secalinus* x *B. grossus nitidus*, the F_1 hybrids of this and the previous cross presenting the appearance of a semi-awned *B. grossus nitidus.*
The F_2 has not been large enough for a detailed analysis. R. M. I.

219. KNOWLES, P. F. 633.262:576.16:576.312.35(79.4)
Improving an annual brome grass, *Bromus mollis* L., for range purposes.
J. Amer. Soc. Agron. 1943 : **35** : 584–94.

The natural variation of *Bromus mollis* in California and Oregon is described. This species, which was probably introduced to California later than 1870, exists in a number of strains which can be grouped into two ecotypes; a late-maturing coastal form and an early-maturing inland form. Cytologically, the species is very uniform ($2n = 28$); meiotic abnormalities are infrequent and self-fertilization is usual.

220. Knobloch, I. W. 633.262:576.312.35:576.356
Morphological variation and cytology of *Bromus inermis*.
Bull. Torrey Bot. Cl. 1943 : **70** : 467–72.

Bromus inermis exhibits intraspecific variation in the following characters: culm length, sheath pubescence, length and width of blade, ligule length, height of panicle, spikelet length, length of first glume, length of second glume, lemma length, palea length and number of florets. The chromosome number in the plants investigated was either 42 or 56. Mitosis is regular, each prophase nucleus containing 1–5 nucleoli. Meiosis is irregular, lagging chromosomes being frequent. In one case, the chromosomes in anaphase I separated as bivalents, equal numbers of which moved to the two poles.

221. Dahms, R. G. 633.282–2.7–1.521.6
Rice stinkbug as a pest of sorghums.
J. Econ. Ent. 1942 : **35** : 945–46.

Some varieties of sorghum were observed to be seriously attacked by *Solubea pugnax*.
Several varieties actually in flower during the attack were the most damaged. Late maturing varieties were the more seriously injured, but apparently there is some difference due to variety both in attractiveness and in resistance.
The bugs were more numerous on the Darso varieties (including the White Darso strains) than on some of the others. White Darso Ks. 33–378, however, was less damaged and gave a higher yield than two other White Darso selections that were infested to the same extent and were at the same stage of maturity when infestation occurred.

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222. Coutinho, L. A. 633.3–2.8:575.243
O "mosaico das leguminosas" agente modificador de genes? (**Mosaic of leguminous plants as an agent modifying genes**?)
Rev. Agron. Lisboa 1942 : **30** : 459–60.

Seeds taken from plants of *Vicia Faba* attacked by mosaic gave rise to some normal plants and some showing various growth anomalies such as dwarfing, narrow pale green leaves, etc. The effect is ascribed to the action of the virus upon certain genes.

223. Nilsson-Leissner, G. 633.321–2.421.6–1.521.6:575(48.5)
Rödklöverförsök på klöverrötsjord vid Svalöf. (**Red clover experiments on soil infected by clover rot at Svalöf**).
Sverig. Utsädesfören. Tidskr. 1942 : **52** : 352–63.

The method used in these trials of the resistance of red clover strains to stem rot (*Sclerotinia Trifoliorum*) is described in detail, together with other questions.
Merkur red clover was particularly resistant.
One strain, élite 13, also showed resistance though further selection is needed if it is to equal Merkur.
The effect of the preceding crop upon infection was also studied.

224. Johnson, I. J. and
Sass, J. E. 633.366:576.356.5:581.04:581.162.5
Tetraploidy in *Melilotus alba* induced by colchicine.
Proc. Iowa Acad. Sci. 1942 : **49** : p. 254.

Considerable differences in the degree of self-fertility have been observed between a number of tetraploid clones of *M. alba* obtained from diploid seedlings by the colchicine technique.

225. Smith, W. K. 633.366:581.165.71:575.127.2.061.633
Propagation of chlorophyll-deficient sweetclover hybrids as grafts.
J. Hered. 1943 : **34** : 135–40.

A chlorophyll-deficient hybrid of *Melilotus alba* x *M. dentata* has been reared to maturity by grafting it on to a stock of *M. officinalis*. It was back-crossed with *M. alba* and seven seeds were obtained which on planting produced five chlorophyll-deficient seedlings and two healthy plants, one with subnormal pigmentation, which have grown to maturity.

226. ŠMATOK, E. G. 633.367:581.6
(Lupins with a low alkaloid content as a fodder for dairy cattle).
Kormodobyvanie (Fodder Production) 1941 : No. 1 : 62–67.

Experiments carried out in 1938–9 showed that yellow lupins containing from 0·018 to 0·05 per cent. of alkaloid could be given as a green feed to dairy cattle without affecting their health or impairing their milk yields. In view of this and of the high protein content of the plant, it is suggested that plant breeders should endeavour to produce in the shortest possible time strains with a low alkaloid content. H. F.

227. 633.367:581.6:575(43)
SENGBUSCH, R. von 633.367:633.85:575(43)
Süsslupinen und Öllupinen. Die Entstehungsgeschichte einiger neuer Kulturpflanzen. (**Sweet lupins and oil lupins. The history of the origin of some new crop plants**).
Landw. Jb. 1942 : **91** : 719–880.

Part one starts with a study of the methods of alkaloid determination necessary for breeding purposes. It is pointed out that a distinction must be made in lupins between the toxicity of the alkaloid and that of a hitherto unknown substance "Ictrogen." Ictrogen may or may not be present in lupins grown under the same conditions.

The presence of alkaloid can be detected by boiling 1 grm of the seeds for two hours in 10 c.c. of water. A few drops of potassium mercuric iodide are added to the hot solution. A white precipitate on cooling indicates the presence of alkaloid. By this method 150 individual plants can be examined by one person in a day.

During the first winter of the experiments, 1927–28, some plants low in alkaloid and two free from alkaloid were found among those of *L. luteus* tested.

A further simplification was devised by which leaves were boiled in water for 20 mins and then the potassium mercuric iodide added. By this method, with 10–12 helpers, 4000–5000 plants were examined daily. In the summer of 1928 plants of *L. angustifolius* were examined by the leaf method, but this proved to be unsuitable, the seeds were therefore successfully used instead and one alkaloid free plant discovered during the winter 1928–29. In the following summer, instead of a leaf, it was found that a piece of the stem with a growing point reacted successfully to the same method as for the leaf and by this means two alkaloid free plants were found. In 1930 it was found that leaves could be placed for 3–5 hours in a 5% solution of hydrochloric acid and then a few drops of iodine potassium iodide added. The method was unsuitable for seeds, but with leaves, 14 assistants could make 20,000 to 25,000 tests in a day. In 1931 plants of *L. polyphyllus* relatively poor in alkaloid were found.

It was then found that by simply soaking the seeds in cold water for 24 hours and adding iodine potassium iodide, the presence of alkaloids could be detected in *L. angustifolius*, but the method was not reliable when *L. luteus* was used. Experiments were made by this method on a number of lupin varieties of which the majority reacted favourably. The use of this method does not affect the future germination of the tested seed.

The use of the hydrochloric acid and iodine potassium iodide method on leaves of tobacco was found satisfactory for the detection of alkaloid. This method was adapted for use with seedlings and plants low in alkaloid were isolated. Experiments by the method with *Galega officinalis* were also successful.

Details are given of experiments with different reagents and modifications in the technique of the methods are described.

Part two consists of a description of a convenient and quick method for the determination of the oil content of a seed and of its use for the first time in the breeding of lupins for oil. The method, which with the necessary apparatus is described in detail, consists in essentials of the pressing of the seed between sheets of fat absorbent paper at temperatures between 80° and 90° C. A comparative study of the ring of oil round the seed gives a measure of the oil content. Seeds of *L. albus* and *L. mutabilis* contain from 11%–13% of oil. Seeds of *Soja hispida* contain 17%–25%; 15% is regarded as the lowest oil content to be aimed at and it is hoped to obtain this objective by breeding.

At one stage it was found possible to estimate the oil content of one half of the seed while preserving the half with the embryo intact for germination. The oil content of a number of lupin varieties is tabulated, but for further breeding only *L. albus* and varieties of *L. mutabilis*,

to which species *L. pantèlericus* also probably belongs, were found suitable. Among the progeny of plants whose seeds had a high oil content were found plants with a higher oil content than the original. The experimental results make it probable that it will be possible to produce a lupin with 17%–18% of oil. Then must follow the combination of high oil content with early ripening and freedom from alkaloid. Although so far only two plants of *L. mutabilis* free from alkaloid have been found and these plants soon died, there is no doubt that in time these will be produced. Nothing is known so far of the quality and utilization of the lupin oil.

Part three recounts the development of sweet and oil-producing lupins, new plants for cultivation. The value of these plants for forage on account of their high content in fat and protein is stressed and compared with other forage plants. The characters of the six species *L. albus*, *L. luteus*, *L. angustifolius*, *L. perennis*, *L. polyphyllus* and *L. mutabilis* cultivated in Germany are briefly enumerated and the improvements to be made are noted. *L. luteus* and *L. angustifolius* have been cultivated for about 100 years, have lost their wild characteristics and now have white and soft skinned seeds and non-bursting pods. After a brief review of the results of other workers interested in the production of sweet lupins, the author outlines the results of his own researches.

Further details are given of the methods for the detection of the alkaloids in *L. luteus*, *L. angustifolius*, *L. mutabilis* and *L. perennis*.

With regard to the inheritance of the alkaloid-free character, it has already been shown by Hackbarth and the author ("Plant Breeding Abstracts", Vol. V, Abst. 717) that freedom from alkaloid is a recessive character and may be conditioned by several different genes. The exact number of genes is not yet known, nor whether there is an allelomorphic series which controls the different degrees of alkaloid content. It is noted that the seeds, with regard to alkaloid content, resemble the mother plant and that therefore it is only in the young plant that the true genetic make-up can be determined. There is probably linkage between the gene for alkaloid freedom and one causing sterility. All the plants free from alkaloid have had light coloured seeds and experiments have shown that there is linkage here also with about 2% of crossing-over. Apart from the sterility noted the sweet lupins have a less luxuriant growth than the bitter lupins and it must be a matter for consideration whether the collection of recessive genes in the selected strains of sweet lupins may lead to a reduction in vitality. Data are given of the fat and protein content and the nitrogen-free extract content of some of the different lupin species.

By selection, strains with "soft shelled" seeds, that is, seeds capable of taking in water through the seed coat after drying, were discovered in *L. luteus* and *L. angustifolius*. Crosses between "hard" and "soft shelled" strains showed that the latter character is conditioned by a single recessive gene (see "Plant Breeding Abstracts", Vol. VIII, Abst. 1219).

Much searching has eventually led to the finding of plants of *L. luteus* and *L. angustifolius* with indehiscent pods. This is due to anatomical differences in structure of the pods from which a rapid method for the determination of non-bursting pods has been devised (see "Plant Breeding Abstracts", Vol. XII, Abst. 483). The character non-bursting pods is due to a single recessive gene and already this character has been combined with alkaloid freedom. The recessive character for white seeds can also be added to the alkaloid-free plants either by crossing or by the occurrence of white seeded mutants among the sweet lupins (see "Plant Breeding Abstracts", Vol. X, Abst. 778). Though it is possible that the oil from bitter lupins might be of value, that from sweet lupins would be preferable and many years of breeding work are probably needed to achieve this object. R. M. I.

228. Coutinho, L. de Azevedo and Lorena, M. da Cunha e. 633.373:576.312.35 633.373:576.312.34

Subsídios para o estudo cariológico do género *Trigonella* L. (**Notes for a karyological study of the genus *Trigonella* L.**).

Agron. Lusitana 1942 : **4** : 73–86; also Rev. Agron. Lisboa 1942 : **30** : 458–59.

Root tip studies showed the somatic chromosome number of 16 for *T. Foenum-Graecum*, *T. radiata*, *T. corniculata*, *T. cretica* and *T. calliceras*. Although certain morphological differences were noted between the chromosomes of *T. Foenum-Graecum* and those of the other species, they are not considered sufficient to warrant the removal of this species from the genus. Slight differences in chromosome morphology were observed between two different forms of *T. Foenum-Graecum* examined.

229. Olsson, P. A. 633.4–2.111–1.521.6:581.192
Om foderrotfrukternas vinterhärdighet. (**On the winter-hardiness of fodder root crops**).
Sverig. Utsädesfören. Tidskr. 1942 : **52** : 343–51.

Winter hardiness of various root crops is discussed in connexion with seed production under Swedish conditions and statistical data from 1921–26 are interpreted as showing that the progressive increase in hardiness observed in the beet series: Röd Eckendorfer [Red Eckendorfer], Barres Halvlång [Barres Medium Long], the Alfa sugar mangel, and the sugar beet, follows approximately the same curve as the dry matter and sugar content of the series. These quantitative characteristics have apparently a decisive effect on the survival capacity of the different varieties, though other factors, e.g. growth habit, profusion of foliage, etc. also play their part.

At Svalöf the turnips surpassed the other root crops in hardiness. Bortfelder and Östersundom are both long shaped, the former with yellow flesh, the latter with white. Bortfelder usually has higher dry matter content than Östersundom and also is more winter-hardy. Dales Hybrid and Grey Stone are both round turnips that do not grow down very deep into the soil and are therefore more exposed to frost. Dales Hybrid has yellow flesh with a considerably higher dry matter content than the white fleshed Grey Stone, yet scarcely any difference was apparent in the figures for winter-hardiness.

The swedes Gul Svensk [Yellow Swedish] and Bangholm, although they have a much higher dry matter content than most of the turnip varieties, stood the Svalöf winters much worse than the turnips.

The covariation between dry matter content and winter-hardiness is quite noticeable in varieties and strains within a particular root crop but not between different root crops.

The Vit Halvlång [White fleshed medium long] carrot appeared more hardy than the red James which has usually a considerably higher dry matter content.

A somewhat similar correlation is thought to exist between dry matter content and keeping capacity in storage and qualitative differences in this latter characteristic have also been found between different varieties and strains of the same root crop.

Apropos of the best method of raising seed of the various root crops, the author suggests that in view of the severe winters of 1940 and 1941 the steckling method should be used with swedes and turnips, as is usual with beet.

230. 633.41–2.3–1.521.6
Beet scab in New York fields.
Plant Dis. Rep. 1942 : **26** : p. 438.

A strain of Detroit Dark Red with long leaves appears to carry resistance to scab (*Actinomyces scabies*).

231. Sun, V. G. 633.42:575.127.2:575.125
(**Hybrid vigor in *Brassica***).
Abstr. J. Agric. Ass. China 1943 : No. 175 : 35–58.

Tayutsai is regarded as a variety of *Brassica juncea* and Siaoyutsai of *B. chinensis*. Hybrid vigour is found in the interspecific cross of these species but not between Siaoyutsai and *B. pekinensis*. The value of intervarietal hybridization in producing new *Brassica* types is discussed.

232. Reimers, F. E. 633.42:581.143.26.03:575
[**The effect of producing turnip seed within a single season (by means of vernalization) upon the biological characters of the progeny**].
Vestnik Ovoščevodstvo i Kartofel' (Vegetable and Potato Journal) 1940 : No. 5 : 47–50.

Because the production of seed from the turnip, a biennial plant, requires storage of the roots and inevitably results in a proportion of losses, the possibility of vernalization as a means of producing seed within the first growing season seemed worthy of study.

Seed produced in the ordinary way at the end of the second growing season was vernalized in the spring of 1937. Seed from the plants which grew from it was in its turn vernalized and

sown in the spring of 1937. The succeeding generation of seed was similarly tested in the spring of 1939. The percentage of bolting and flowering which occurred in each generation of plants and the intervals between planting and the beginning of bolting, and between the latter and the beginning of flowering were observed. It was found that the effect of vernalization upon each succeeding generation was a progressive intensification of the biennial character of the plants. Thus, seed vernalized in 1937 gave rise to the largest proportions of bolting and flowering in the first year, and that of the third generation of vernalized seed, itself vernalized in 1939, exhibited the least degree of bolting and flowering. Vernalization was also observed to prolong the two intervals referred to above.

While he is unable to conclude that such results justify a belief that vernalization in the manner described can bring about changes in the inheritable characters, the author nevertheless points a way to the solution of the problem. He concludes, however, that there is no ground for the belief that seed obtained from "bolters" will pass on the character of "bolting" to succeeding generations.

He is also of the opinion that the quality of the roots grown from seed produced within a single season is no worse than that of ordinary roots. I. Z.

233. Sun, V. G. 633.42:581.331.2:582
(A study of the size of pollen grains in the genus *Brassica*).
Abstr. J. Agric. Ass. China 1943 : No. 175 : 20–34.

It is suggested that pollen grain size may be utilized as a taxonomic criterion in the systematic study of the genus *Brassica.*

234. Filippov, A. S. 633.491:575.127.2:581.165.71
("Vegetative rapprochement" as a means of overcoming cross-incompatibility in potatoes).
Vestnik Ovoščevodstvo i Kartofel' (Vegetable and Potato Journal) 1941 : No. 1 : 36–42.

In continuation of an earlier article (cf. "Plant Breeding Abstracts", Vol. XIII, Abst. 1276), experiments are reported in which young seedlings of *Solanum acaule* were grafted on to different varieties of *S. tuberosum*; all but 2–4 leaves were removed from the plants serving as rootstock, on which only 2–3 shoots were allowed to develop. All flower buds were removed from the scion until the rootstock was ready to flower. Flowers of the *S. acaule* scion were then pollinated with pollen from a number of different domestic varieties, the flowers being bagged but not emasculated. From 1000 flowers pollinated, 41 berries with seeds were obtained. Crosses were also made between different F_1 seedlings of similar crosses made in previous years and between these F_1 seedlings and domestic varieties. In all, 3500 seeds were obtained for use in selecting for cold resistance. An earlier frost resistant hybrid, *S. acaule* x Fürstenkrone, obtained by "vegetative rapprochement", was also crossed with a blight resistant hybrid (*S. semidemissum* x Fürstenkrone) x Fürstenkrone.

The F_1 seedlings were all very much of the cultivated type but displayed certain features of *S. acaule*, including low growth habit, long stolons and frost resistance; all had 48 chromosomes. Their tuber yield varied between 100 and 640 grm per plant, as against 0 grm. in an F_1 seedling of *S. acaule* x *S. tuberosum* produced without "vegetative rapprochement". Even second and third back-cross seedlings obtained in the ordinary way yielded less than the F_1 seedlings from "vegetative rapprochement".

One of the most frost resistant and high yielding seedlings was back-crossed on to Fürstenkrone, giving rise to 136 seedlings: these showed certain *S. acaule* characters, including frost resistance and long stolons, but were otherwise of the domestic type; the percentage of fertile pollen grains varied from 0 to 90, and some of them set seed spontaneously. Some seedlings remained undamaged by −3° C. to −3·5° C.

None of the back-cross seedlings was resistant to *Phytophthora*. Most of them had 48 chromosomes but three were found with 52 and one with 36, in contrast to back-crosses of F_1 plants obtained without "rapprochement", all of which had 72.

The best of the back-cross hybrids have given yields equal to Lorch, the tubers being small and numerous, elongated like Fürstenkrone and later in maturing: they are being further crossed with domestic varieties.

235. FILIPPOV, A. S. 633.491:575.247
(Mixed inheritance and vegetative segregation in the potato).
Vestnik Ovoščevodstvo i Kartofel' (Vegetable and Potato Journal) 1940 : No. 5 : 106–12.

The variety 8670 (Blight Resister), with blue tubers, was pollinated with a form of *S. andigenum* having white tubers. The progeny showed great variation in tuber colour and two seedlings bore a certain number of parti-coloured tubers. Even the white tubers of such a plant gave rise to some parti-coloured tubers in the vegetative progeny, while the parti-coloured tubers gave rise to some white tubers in their vegetative progeny. The seed progeny of one of the parti-coloured seedlings contained 37 plants with white tubers and 99 with tubers displaying various degrees of mottling. An examination of some 3000 different hybrids in 1940 revealed the presence of about 300 showing mottling and 15 cases of vegetative segregation in 1st year seedlings. Some of the most interesting cases are described. They occurred both in crosses where one of the parents was *S. andigenum* and in crosses between two *S. tuberosum* varieties. The author concluded that if variation occurs in respect of colour, it may also be expected in respect of physiological and agricultural characters. Hence selection ought to be performed not only within the family but also within the tubers of a single seedling when carrying out potato breeding.
Certain colour variations were observed also in the tubers from grafts between domestic varieties differing in tuber colour.
The results obtained are compared with those of Darwin.

236. SOLODOVNIKOV, F. S. 633.491:575.257
(Significance of age and origin of grafted potato plants in vegetative hybridization).
Vestnik Ovoščevodstvo i Kartofel' (Vegetable and Potato Journal) 1940 : No. 3 : 20–27.

Grafts were made of Smyslowskii (Fürstenkrone) and Katahdin on Wohltmann, a variety very rich in starch; grafts of Wohltmann on Wohltmann served as control. Grafting with Fürstenkrone caused several alterations in the tuber shape, whilst grafting with Katahdin produced no such changes. The plants arising from the altered tubers from the grafts with Fürstenkrone gave rise to plants which also differed from the controls, and the tubers they produced bore a still stronger resemblance to Fürstenkrone than those of the first year. They contained 3–5% less starch than the controls and were 25–30 days earlier in maturity.
Grafts were made of *Solanum demissum* on Wohltmann and Alma. The tubers of the grafted plants gave rise to plants which showed no morphological deviations from the maternal type but proved to be resistant to phytophthora in the field and were very little attacked when artificially inoculated. Grafts of Alma on to *S. demissum* produced a number of suckers from the rootstock, and some of these were used as cuttings to produce new plants. The plants produced had 48 chromosomes and were of the cultivated type, though showing certain characters of *S. demissum*, including blight resistance; their tubers were deep bluish-violet in colour, thus differing from both parents but resembling sexual hybrids between the two. The plants obtained from these tubers were also pigmented. No such changes were observed when Fürstenkrone and Lorch were grafted on *S. demissum*.

237. TUCKER, J. 633.491:575.74(72)
Potatoes in Mexico.
Amer. Potato J. 1943 : **20** : 218–23.

The potato varieties commonly planted in Mexico are listed. Native varieties appear to be running out and the need for breeding work is stressed.

238. 633.491:581.6:575.12
Items. A fine new potato named Mohawk.
Science Suppl. 1943 : **98** : No. 2534 : p. 10.

The variety Mohawk (U.S.D.A. Seedling No. 46,000) is described. It arose from Green Mountain x Katahdin and is distinguished by high yields, resistance to several diseases, and good baking quality.

239. Akeley, R. V. and Stevenson, F. J. 633.491:581.6:575.125
Yield, specific gravity, and starch content of tubers in a potato breeding program.
Amer. Potato J. 1943 : **20** : 203–17.

Varietal differences and genetical behaviour have been investigated with reference to the following characters: yield, specific gravity and starch content. These features depend a great deal on environmental factors and the interaction between the latter and the genotypes of the various varieties has been examined. Selfing results in a deterioration in these qualities but heterosis was observed in the cross Chippewa x Katahdin; it appears that hybrid vigour may result from a cross between parents heterozygous for a number of characters.

Several European varieties have a higher starch content than the American but, since the latter yield better, they produce more starch per acre. Ackersegen is probably an exception as it produces as much starch per acre as American varieties; it has, however, many undesirable commercial characters.

240. Lechnovicz, B. C. 633.491:582(85)
Nuevas variedades peruanas del *Solanum andigenum.* (**New Peruvian varieties of *S. andigenum*).**
Bol. Mus. Hist. Nat. "Javier Prado" Peru 1941 : **5** : 427–30.

Three new varieties and two new forms of the cultivated potato species *Solanum andigenum* Juz. et Buk. are described. They were collected by Sr P. S. Vallejos from Peru, dept. Ancash.

J. G. H.

241. Vinogradova, N. B. 633.491–2.411.4–1.521.6:575(47)
(Methods of breeding potatoes for blight resistance).
Vestnik Ovoščevodstvo i Kartofel' (Vegetable and Potato Journal) 1940 : No. **3** : 39–71.

A full account is given of the biology of the fungus *Phytophthora infestans* de Bary.

Cultures of the parasite raised on leaves of the resistant variety 8670 all proved more virulent than ordinary cultures and attacked the leaves of all potato varieties except *S. Antipoviczii*; a number of hybrid seedlings however proved resistant even to the more virulent form. When the virulent form was reproduced on tubers it soon lost its virulence and it is regarded as being a modification rather than a distinct race of the fungus.

The nature of blight resistance in the potato and the influence of manuring and other external factors is discussed. The evidence as to how far resistance is affected by the age of the plant is regarded as inconclusive and tests for resistance should be carried out throughout the vegetative period. Potassium manuring, low humidity and long day are all regarded as factors which increase blight resistance and experiments in which these factors were applied in varying doses are described. *S. demissum* remained immune in all treatments, seedling 40355 c/35 was resistant under conditions of high N but slightly susceptible with high K; others were less resistant in the high N treatments. Short day and watering, applied together, reduced the resistance, though either of these factors alone tended to increase resistance somewhat under the conditions of the hot dry summer in which the experiments took place. In general it is concluded that any combination of factors that produces a strong healthy plant also promotes resistance.

Leaf and tuber resistance are not always correlated and leaf resistance is regarded as being of more practical importance than tuber resistance. Various methods of testing for leaf resistance are described. Tests of single leaflets proved somewhat more severe than tests of the whole plant and some plants were classed as susceptible by the former method and resistant by the latter method; otherwise the two methods gave comparable results. Tests on unrooted cuttings gave results identical with those obtained with single leaflets.

Another method that has been used with success is the application of pieces of diseased leaf to the leaves of the plant to be tested.

The resistance of selfed and crossed seedlings did not always correspond to that of the parents, being sometimes higher but more often lower.

No correlation has been observed between resistance and content of solanin or organic acids, but resistant plants tend to have a higher peroxidase and sistoamylase content than susceptibles.

In breeding for *Phytophthora* resistance the seedlings in the early stages are tested by the leaflet method and observations are also made in the field. All field susceptible seedlings are discarded and the selected seedlings are tested in later years by artificially infecting whole plants in the greenhouse. No agreement was observed however between seedling reaction and the reaction of the mature plant. No artificial test can, it is thought, entirely take the place of field observations and it is desirable to grow all promising seedlings as soon as possible in infected fields in various localities so as to test their behaviour under natural conditions.
Progenies from a number of resistant varieties all proved susceptible, from which the authoress concludes that the Mendelian laws are invalid.
Tests of a number of forms of *S. demissum* showed some of them to be homozygous for resistance, which they transmitted to their progeny both on selfing and on crossing with the domestic variety Fürstenkrone; *S. demissum tlaxpehualcoense* 024, 029, and 0221/011, *S. d. xitlense* 09, *S. demissum* 0249/086, 037, 0245/c9 and 0232/c4 and *S. demissum* Vilmorin were all included in this group. Many other forms of *S. demissum*, though themselves resistant, gave a few resistant forms in the progenies: these included *S. d. xitlense* 010 and 063, *S. d. tlaxpehualcoense* 027c, 012, 123 and 0250/038, and *S. d. adpressoacuminatum* 014c. Many forms were found to be definitely unsuitable for breeding, because they were themselves suceptible or gave susceptible offspring, or both: such were *S. d. tlaxpehualcoense* 025, 033, 031, 0223/c1, 0323/c6, *S. demissum* 0227/021 and 035, *S. demissum* I gr. 0236/029 and 0229/022, *S. demissum* Monte Alegre 0/243/032a(B), *S. demissum* II gr. 0321/c4, *S. demissum* Atrocianeum 0225/022(B), and *S. demissum* 0254/c2.
Tests with a number of clones of *S. Antipoviczii album coloratum* showed them all to be susceptible. Two out of eight forms of *S. neoantipoviczii* tested proved resistant, namely *S. n. altiforme* 0273 and *S. neoantipoviczii* 0276/058B.
All sex forms of *S. Reddickii* tested were susceptible, as were five forms of *S. ajuscoense*, four of *S. vallis-Mexici* and one of *S. verrucosum*. No tests were made of *S. semidemissum*, *S. bulbocastanum*, *S. cardiophyllum*, *S. coyoacense* and other species that have been reported to be resistant to blight.
The conclusion is reached that *S. demissum* is the most useful species to use in breeding for blight resistance.

242. Rawlins, W. A. 633.491–2.7–1.521.6(74.7)
Some varietal differences in wireworm injury to potatoes.
Amer. Potato J. 1943 : **20** : 156–58.
Varietal differences of potato to wireworm injury are reported but the reasons for the differences observed are not apparent.

243. Younkin, S. G. 633.491–2.8–1.521.6
Purple-top wilt of potatoes caused by the aster yellows virus.
Amer. Potato J. 1943 : **20** : 177–83.
The symptoms of purple-top wilt have been produced by inoculating potato varieties with a strain of aster yellows virus. Rural and Katahdin are more susceptible to this virus than Green Mountain.

FIBRES 633.5

244. Peebles, R. H. and Smith, E. G. 633.51:575.113:575.123
Inheritance of oil glands in Pima cotton.
J. Agric. Res. 1943 : **66** : 447–52.
The various characters affecting the appearance of glands were found to fall into two classes, the members of each class being completely associated during inheritance. In the first class the following characters were found: smooth boll surface, late development of boll glands, small and sunken stem glands and small calyx glands, while in the second the alternative characters: pitted boll surface, early development of boll glands, large and only slightly immersed stem glands and large calyx glands, occur. The two classes exhibit a monohybrid type of inheritance. It is thought probable that the association of characters is due not to linkage but to the manifold effect of a single pair of genes. A large increase in the number of boll glands occurs in the F_1 of a cross between the two types and this is regarded as a particular manifestation of heterosis.

245. MARTINS, R. G. 633.51:575.42(81)
A seleção individual no melhoramento do algodoeiro. (**Individual plant selection in cotton breeding**).
Bol. Minist. Agric., Rio de J. 1939 : **28** : 47–60.
The technique of artificial selection used in cotton breeding is described. Earliness, vigour, yield and disease resistance are the characters on which field selection is based, boll size and weight, lint percentage, length and index, and seed weight being determined in the laboratory. Selection is always carried out in the locality for which the new varieties are designed.

246. MOORE, J. H. 633.51:578.08
Correlation of combed staple length on the cottonseed with commercial staple length in American upland cotton.
J. Amer. Soc. Agron. 1943 : **35** : 491–98.
A highly significant correlation coefficient ($r = +0{\cdot}89$) has been found between combed staple length and commercial staple length determinations.

247. GRIMES, M. A. 633.51:581.6:578.08
A comparison of five methods of measuring fineness of cotton fibres.
Textile Res. 1941 : **11** : 459–66. [From Biol. Abst. 1943 : **17** : Sect. D. Abst. 19032].
The methods, which were applied to 5 varieties of cotton, were weight per inch, area of cross sections, widths of fibres collapsed, flooding with NaOH, and mercerizing without tension. Any of these methods will detect wide differences in fineness. Small differences may not be determined with certainty.

248. RICHMOND, T. R. 633.51–1.421:519.24
Competition in cotton variety tests.
J. Amer. Soc. Agron. 1943 : **35** : 606–12.
An appreciable degree of competition has been demonstrated between cotton varieties laid out in field tests. Generally speaking, the highest yielding varieties competed most strongly and plants growing in outside rows outyielded those of the same variety in the inside rows.

249. 633.52(46.9)
O linho em Portugal. (**Flax in Portugal**).
Direcção Geral dos Serviços Agrícolas, Minist. Econ. 1943 : Pp. 292.
A full account is given of the cultivation and utilization of flax in Portugal and of the investigations carried out in 1941; these included manurial tests and trials of a number of imported varieties such as Belgian Blue, Dutch White, and certain German varieties, using local strains as a standard of comparison. The imported varieties have proved superior both in yield and length of stem; their average yield of dry straw was 5·163 kg. per ha. as against 3·420 kg. for the local strains. The yield of seed was greater in the local forms, which produced an average of 890 kg. per ha. as compared with 546 kg. from the imported varieties. The local strains also had a greater standing capacity, and were 7 to 27 days earlier in maturity.

250. NEUER, H. and
SENGBUSCH, R. v. 633.522:575.18
Die Geschlechtsvererbung bei Hanf und die Züchtung eines monöcischen Hanfes. (**Sex inheritance in hemp and the breeding of a monoecious hemp**).
Züchter 1943 : **15** : 49–62.
To find out if it were possible in practice to breed a monoecious hemp with increased seed yield and fibre yield per unit area, one hundred inter-sex plants were selected in 1935 and 1936. These inter-sex plants were very rare and when found were fully in flower and already crossed with normal males giving an F_1 of almost exclusively pure females and pure males. In the next generation the flowers of the pure males were removed before flowering so that crossing was only possible between the inter-sexes. From the progeny, only the ideal monoecious types made up of about equal parts of male and female flowers were used in further breeding. A study was made on the various types of monoecious plants and the possibility of stabilizing them.

Five types were identified ranging from plants with many male flowers and few female flowers to plants which were practically pure female with only isolated male flowers.
Crosses were made between these types among themselves and with normal female plants from which the conclusions are drawn: that, if from the cross of normal females and monoecious plants, practically only females occur, the monoecious plant must have the homogametic XX character, and secondly that dioecious habit is dominant to monoecious. This dominance is not complete as in crosses between monoecious plants a few female plants occur. These female plants when crossed with monoecious plants gave an F_1 with 50% female and 50% monoecious and must accordingly be assumed to be genotypically different. The male flowering plants with female habit which occurs in the progeny of monoecious plants must be XX like their parents and therefore must be regarded not as "feminized males" but as "masculinized females". Normal males occur only when dioecious plants are pollinated with pollen from normal males and by isolation the percentages of normal males can be reduced to under 1%. By the use of a modification of the "Restsaatgut" method (used in rye breeding) it is possible to select only the best plants for pollination.
By breeding monoecious hemp, plants ripening at the same time are obtained and thereby a more uniform product for industrial purposes. R. M. I.

251. Robinson, B. B. 633.522:581.6:578.08
Marihuana investigations. IV. A study of marihuana toxicity on goldfish applied to hemp breeding.
J. Amer. Pharm. Ass. 1941 : **30** : 616–19.
Varietal differences in the content of marihuana resins have been investigated in hemp (*Cannabis sativa*). It is suggested that the toxic effect of the resins on goldfish furnishes a suitable technique for quantitative analysis.

252. Ball, C. R. 633.584.3:582
Far western novelties in *Salix*.
Madroño 1942 : **6**(7) : 227–39.
The author describes two new varieties of *S. pulchra* and then proceeds to examine critically the varietal and specific status of other *Salix* spp. from western North America.

SUGAR PLANTS 633.6

253. Lauritzen, J. I. 633.61:581.6:575
Windrowing qualities of C.P. 34–120 and certain other commercial varieties of sugarcane in Louisiana.
Sug. Bull., N.O. 1943 : **21** : 200–02.
The difficulties that attend the production of a high quality windrowing cane are outlined. It is suggested that C.P. 34/120 is more satisfactory in this respect than Co.281.

254. Forbes, I. L. and
Mills, P. J. 633.61–2.8–1.521.6
Disappearance of virus from mosaic-diseased sugarcane plants.
Phytopathology 1943 : **33** : 713–18.
The authors show that the occurrence of symptom-free shoots from virus infected seed stalks is due, not to symptomless infection, but to absence of the virus.

255. Summers, E. M. 633.61–2.8–1.521.6(76.3)
Effect of mosaic caused by different strains of virus upon yields of susceptible sugarcane varieties.
Sug. Bull., N.O. 1943 : **21** : 181–83.
Varietal resistance of sugar cane to several strains of mosaic virus is described.

256. 633.62–1.524:581.6:575.12(73)
Dr Brandes explains the sorgo situation.
Sug. Bull., N.O. 1943 : **21** : 175–76.
In order to obtain varieties of sweet sorghum with a high sugar content, it will be necessary to collect specimens of the high yielding varieties grown by the natives in equatorial Africa. These are short day forms and will require to be crossed with the standard varieties in the U.S.A.

STIMULANTS 633.7

257. McKinney, H. H. 633.71–2.8–1.521.6
Reaction of resistant tobaccos to certain strains of Nicotiana virus 1 and other viruses.
Phytopathology 1943 : **33** : 551–68.

The reaction of a number of *Nicotiana* varieties to various viruses is described. It is not possible to deduce the resistance of a variety to viruses in general by observing its reaction to any particular inoculation since the order of virulence of the viruses for one particular host is not necessarily the same as for another. The various gene combinations determining resistance to virus diseases may be related to each other in a very complex way and all strains of a virus would have to be inoculated in order to establish precisely the genetic systems concerned. Variety T.I. 448A is one of best genotypes for resistance to common mosaic virus.

258. Valleau, W. D. 633.71–2.8–1.521.6:575.11
Breeding tobacco for resistance to mosaic.
J. Bact. 1942 : **43** : p. 272.

Two types of resistance to tobacco mosaic should be distinguished. The first, found in Ambalema tobacco, is determined by at least two Mendelian factors while the second, present in *Nicotiana glutinosa*, is also determined by a gene complex including the necrotic spotting factor. Both types of resistance have been transferred to burley and some strains combining both types have also been produced.

259. Stoffels, E. H. J. 633.73:575.42
La sélection du caféier arabica à la station de Mulungu. (**The selection of *arabica* coffee at the Mulungu station**).
Publ. Inst. Agron. Congo Belge 1941 : Sér. Sci. No. 25 : Pp. 72.

A continuation of a previous communication reviewed in "Plant Breeding Abstracts", Vol. VII, Abst. 733. Detailed data are given of a population of 1757 coffee trees of the local variety Mibirizi; of the characters essential for the selection of mother trees; and variations of correlations, fruit characters and observations on the progeny of certain mother trees of some *arabica* crosses. Data are given of the yield and behaviour of the first generation of a number of open-pollinated mother trees. There was considerable variation. The high yields of the most productive lines are attributed to resistance to die-back. The size of the beans is a dominant character and the uniformity of the majority of the lines confirms the homozygosity of *C. arabica*. R. M. I.

AROMATIC PLANTS 633.8

260. Takahasi, N. and Osumi, T. 633.8:575.11.061.6
(On the inheritance of the colour of stem and fruit in *Panax Ginseng*, C. A. Meyer).
Jap. J. Genet. 1940 : **16** : 273–76.

Normally *Panax Ginseng* has dark purple stems and bright red fruits termed type P–R by the author. Two plants with green stems and yellow fruits (termed type G–y) were found in two different localities in Chosen and another with a green stem and bright red fruit (type G–R) was subsequently discovered. Observation of subsequent generations of G–y showed that P–R was completely dominant to G–y and the F_2 segregation was 3P–R:1G–y; while the subsequent generations of G–R revealed 8 constant G–R strains and 20 segregating 3G–R:1P–R, an approximate ratio of 1:2.

To explain his findings the author postulates a gene *P* conditioning anthocyanin in stem and fruit, while its recessive *p* results in green stems and yellow fruits. In addition an inhibitory gene H is assumed to account for the green stem found in some cases where *P* is present. P–R, G–R and G–y may therefore be represented as *hhPP*, *HHPP* and *hhpp* respectively.

A number of crosses between P–R, G–R and G–y were made and the F_1 ratios showed good agreement with those calculated on the basis of the above factorial interpretation.

CONDIMENTS 633.84

261. Barnes, W. C. 633.842:575:631.524(73)
Varietal characters of importance in paprika breeding.
Proc. Amer. Soc. Hort. Sci. 1943 : **42** : 575–78.

A number of paprika varieties have been introduced into the U.S.A. from Europe. Considerable intervarietal variation has been observed and a breeding programme has been initiated to combine the best features of the different types.

OIL PLANTS 633.85

262. Džidžavadze, S. Š. 633.85–1.524(47)
(Further data on the oil bearing plants of the Soviet humid subtropics).
Sovetskaja Botanika (Soviet Botany) 1941 : No. 5–6 : 43–48.
Descriptions are given of a number of new oil bearing plants acclimatized in the Soviet Union. These include *Mallotus japonicus*, which yields an oil similar in properties to tung oil, and *Buxus sempervirens*, which yields a ton per hectare of an oil that dries quicker than linseed oil.

263. Stahmann, M. A.,
Link, K. P. and
Walker, J. C. 633.853.49–2.412.5–1.521.6:581.6
Mustard oils in crucifers and their relation to resistance to clubroot.
J. Agric. Res. 1943 : **67** : 49–63.
The authors have investigated the mustard oil content of the roots of selected varieties of turnip, black and white mustards, cabbage and horseradish. In all these cases, the mustard oil present was β-phenethyl isothiocyanate; in the horse-radish, an almost equal amount of allyl isothiocyanate was present in addition. In no case could the authors detect any correlation between mustard oil content and the degree of resistance to club root (*Plasmodiophora Brassicae*) nor was the latter character related to the concentration of thioglucosidase. These conclusions were confirmed by the observation that varieties resistant to club root maintained this character when grown in nutrient solutions devoid of sulphur.

264. Fuelleman, R. F. and
Burlison, W. L. 633.853.55:576.16:581.6
Castor beans—an industrial war crop.
Seed World 1943 : **53** : No. 8 : 12–13.
Varietal characteristics, including oil content, of castor beans are described. It is believed that the Connor types, including Connor (Texas), Connor (Missouri), San Benito and Doughty **11**, all arose from a variety once grown in either Missouri or Kansas.

265. Dillman, A. C. 633.854.54:575
Breeding flax resistant to rust.
Oil Paint Drug Rep. 1942 : **142** : No. 17 : 3, 40B.
Efforts are being made to produce linseed varieties that will be superior to Bison both in rust resistance and in the drying quality of the oil.

266. Angelo, E. 633.854.56–2.111–1.521.6:575
Some outstanding seedling progenies of tung.
Proc. Amer. Soc. Hort. Sci. 1943 : **42** : 315–17.
Tung trees have been selected for yield and frost resistance. It has also been noticed that progeny tend to resemble the female parent.

MEDICINAL PLANTS 633.88

267. 633.885.1:581.6:575
Cinchona breeding.
J. N.Y. Bot. Gdn 1943 : **44** : p. 192.
Dr Chandler has resigned from the scientific staff of the New York Botanic Garden in order to assist in breeding *Cinchona* for high alkaloid content.

RUBBER PLANTS 633.91

268. Perry, B. A. 633.912:576.312.35
Chromosome number and phylogenetic relationships in the Euphorbiaceae.
Amer. J. Bot. 1943 : **30** : 527–43.
A list of chromosome numbers is presented for the Euphorbiaceae and these are discussed in relation to taxonomic and phylogenetic problems.

269. Schultz, E. F. 633.913:575(82)
La vara de oro "Solidago" spp. **(Golden rod, *Solidago* spp.).**
Rev. Industr. Agric. Tucumán 1942 : **32** : p. 340.
It is pointed out that prolonged genetical work will be necessary before varieties of this plant suitable for rubber production can be produced.

270. KUPCOV, A. I. 633.913:575.42
(Division of the leaf lamina in *T. kok-saghyz* as a significant selective character).
C.R. (Doklady) Acad. Sci. U.R.S.S. 1942 : **34** : 26–30.
Three types of leaf shape may be recognized in *T. kok-saghyz*, viz. entire, lobed and pinnatisect. These may succeed each other during development in the order given or, alternatively, only entire leaves or the sequence of entire to lobed leaves may be found.
A correlation between large root size and the formation of pinnatisect leaves has been observed, not only in *T. kok-saghyz* but in other species of the genus *Taraxacum*. Although environmental factors influence both root size and leaf shape, these characters are also determined genetically and can be selected with advantage.

FRUIT TREES 634

271. VEN'JAMINOV, A. N. 634:575.247
(Improvement of old varieties of fruit trees by selection of vegetative mutations).
Plodovo-Jagodnye Kul'tury (Fruit Crops) 1940 : No. 5 : 15–20.
The role of vegetative mutation in fruit breeding is emphasized. At the present time there are 24 different variants of the Antonovka apple, 11 of Anise and 3 of Kocičnyi. The Jaffa orange and other instances are cited from the citrus crops.
A study was made of 1600 trees of the Ljubskaja sour cherry, among which 211 vegetative mutants were found, differing in floral characters, growth habit and size, and in shape, flavour and quality of fruit. The frequency of vegetative mutations tends to increase with the age of a variety but Michurin has shown that it is particularly high too in young hybrid trees. Cuttings should therefore never be taken from a young tree before it has fruited. Grafted trees are more prone to mutate than trees on their own roots, and cultivated varieties more prone than wild forms.

272. BORISOGLEBSKII, A. D. 634–2.111–1.521.6(47)
(In memory of I. A. Efremov).
Plodovo-Jagodnye Kul'tury (Fruit Crops) 1940 : No. 4 : 82–84.
The work of the late I. A. Efremov is mentioned. By sowing seeds and selecting the seedlings Efremov produced 12 varieties of apples, 10 of plums and 2 of peaches, all capable of growing in the Amur region where winter temperatures of —52° C. are sometimes experienced.

273. USATOV, S. P. 634–2.111–1.521.6(47)
(The campaign for fruit growing in the north).
Plodovo-Jagodnye Kul'tury (Fruit Crops) 1940 : No. 4 : 80–81.
By sowing the seeds and selection among the surviving seedlings, the author has produced many hardy new varieties of apple, pear, plum, sour cherry, apricot and small bush fruits.

274. MCVAUGH, R. 634.1:575.12:582(73)
The status of certain anomalous native crab-apples in eastern United States.
Bull. Torrey Bot. Cl. 1943 : **70** : 418–29.
The author suggests that many and perhaps all of the individual trees referred to *Malus platycarpa* Rehd. are hybrids between cultivated apple varieties and native species of the section *Chloromeles*.

275. DIBROVA, P. A. 634.11–1.524(47)
(New apple varieties from the northern Urals).
Plodovo-Jagodnye Kul'tury (Fruit Crops) 1940 : No. 4 : 30–41.
Varieties of fruit trees introduced from elsewhere, even from adjacent provinces, will not grow in the northern Urals and the local inhabitants have produced a number of their own varieties by sowing the seeds of many different kinds of fruit and selecting the best of the surviving seedlings. Some of the varieties produced in this way thrive well and bear fruit of quite good quality; 95 valuable varieties of apple, 6 of sour cherry and 4 of plums have been described.

The method of producing these seedlings is described and descriptions and illustrations are given of the best of the apples, some of which have survived for periods of 40 years or more, during which time the temperature has occasionally been as low as —50° C.
Crossing these seedlings with the best European varieties is recommended as the next step in improvement.

276. Žavoronkov, P. N. 634.11–1.524(47)
(Forms of the Siberian crab apple).
Plodovo-Jagodnye Kul'tury (Fruit Crops) 1940 : No. 5 : 53–59.
On account of the importance of *Malus baccata* L. for breeding frost-resistant apples, a study was made of 2625 trees in a collection growing at Omsk. The material was found to be very uniform and what differences were observed between the forms were not very pronounced. All the trees were frost-resistant. The trees bearing fruits above the average in size were selected; the maximum fruit diameter was 2 cm. and maximum weight 2 grm. Flavour and state of health were also taken into account.
Descriptions are given of the forms that have been selected.

277. Birjukov, A. P. 634.11–1.524:575(47)
(New apple varieties in the forest steppes of the Trans-urals).
Plodovo-Jagodnye Kul'tury (Fruit Crops) 1940 : No. 4 : 45–49.
A search was made for seedling apple trees in the gardens of the Trans-ural area and over 300 forms were found. Twenty of them were selected on the grounds of yield, frost resistance, quality of fruit and keeping capacity, and are here briefly described, with notes on their origin where known.

278. Varentsov, I. J. 634.11–1.524:581.6(47)
(Chemical and technological characteristics of the Reinette apples of the Krasnojarsk zone).
Plodovo-Jagodnye Kul'tury (Fruit Crops) 1940 : No. 4 : 69–76.
The semi-wild Siberian Reinettes are the product of natural selection against the most extreme climatic conditions and exist in a variety of different forms. A study has been made of these forms and descriptions are here given of some of them; data are presented concerning the origin, size, quality, keeping capacity and chemical composition of the fruit and the quality of the jam, wine and liquor produced from it. Some varieties are suitable for eating, others only for preserving.

279. Oloničenko, A. I. 634.11–2.111–1.521.6:575(47)
(A new apple variety for Siberia).
Plodovo-Jagodnye Kul'tury (Fruit Crops) 1940 : No. 4 : 28–29.
Selections for winter hardiness and size of fruit were made among several thousand seedlings of the apple variety Arkad Dymčatyi. The best selection was propagated on a *Malus baccata* stock, which caused it to produce larger and less acid fruits. The new variety, which has been named Poljarnoe [Polar], withstands temperatures of —59° C. and is also extremely drought resistant.

634.13–1.524(47)
280. Kalašnikov, V. M. 634.13–2.111–1.521.6(47)
(Cultivated varieties of pear of the Far East).
Plodovo-Jagodnye Kul'tury (Fruit Crops) 1940 : No. 4 : 50–56.
The climatic conditions of the Far Eastern Provinces of the U.S.S.R. are too severe for *Pyrus communis* and all the pears grown belong to the local species *P. ussuriensis*, *P. ovoidea*, *P. serotina* or their hybrids. Some of the commonest forms are described and illustrated, with indications of their origin and the regions for which each is suited. Though most of them are inferior to the pears of the northern U.S.S.R. in quality, their extreme frost resistance makes them valuable both for immediate cultivation and for hybridization.

281. ŽAVORONKOV, P. A. 634.13–2.111–1.521.6(47)
(The pear in the Čeljabinsk province).
Plodovo-Jagodnye Kul'tury (Fruit Crops) 1940: No. 4 : 57–59.
Brief descriptions are given of some of the pear varieties that have survived the severe conditions of the winter in the Čeljabinsk province.

282. DRAIN, B. D. 634.13–2.3–1.521.6:575.127.2
Southern pear breeding.
Proc. Amer. Soc. Hort. Sci. 1943 : **42** : 301–04.
Crosses have been made between *Pyrus serratula*, *P. Calleryana* and *P. ussuriensis*, on the one hand, and Vermont Beauty, Seckel, Bartlett, Worden Seckel and Clapp, on the other. Only 28·8% of the progeny have remained free from fire-blight while none of them has produced promising fruit. A number of seedlings have been reared from hybrids of commercial varieties and *P. serotina*. Although quality is not high, fire-blight resistance has been found in a fair number of cases, and some lines are thought worth while developing. The genetics of defoliation behaviour has been investigated.

283. TIKHONOV, N. N. 634.22–1.524(47)
[The Ussuri plum (*Prunus triflora*)].
Plodovo-Jagodnye Kul'tury (Fruit Crops) 1940 : No. 4 : 15–27.
This species was introduced into the Far Eastern Provinces of the U.S.S.R. many centuries ago from China or Korea and later became wild, owing to its extreme hardiness, some forms having withstood temperatures of −56° C. Fresh introductions have recently been made from Manchuria: these, though somewhat less hardy, include many valuable types, the best of which are nearly equal to the European domestic plum in fruit flavour and sugar content. The plants are almost self-sterile but set fruit freely when several varieties are allowed to interpollinate.
Descriptions are given of some of the most promising of the introductions and hybrids. Many of the hybrids have been obtained by crossing *P. triflora* forms with *P. Besseyi* or with American *P. Besseyi* hybrids. The hybrids are occasionally hardier than either of the parents. Some data are given showing the way *P. triflora* and its hybrids will thrive in severe northern climates, and the main diseases to which it is subject are described.

284. SALAMATOV, M. P. 634.22–2.111–1.521.6(47)
(The plum in the Čeljabinsk province).
Plodovo-Jagodnye Kul'tury (Fruit Crops) 1940 : No. 4 : 62–63.
The hardiest plums in the Čeljabinsk province have proved to be those introduced from the Far Eastern provinces of the U.S.S.R., most of which have arisen from *Prunus triflora*. Certain Canadian hybrids of *P. nigra*, *P. americana*, *P. salicina* and *P. Besseyi* are also very hardy. A certain number of promising new forms have been produced by selecting seedlings of *P. triflora* and of the Canadian hybrids.

285. KELLI, A. Č. 634.23–2.111–1.521.6(47)
(The sour cherry Ural'skaja Krasavitsa).
Plodovo-Jagodnye Kul'tury (Fruit Crops) 1940 : No. 4 : 60–61.
The variety Ural'skaja Krasavitsa [Ural Belle] was selected by G. S. Lopatyškin in Sverdlovsk from the local Ural sour cherry and has remained undamaged by frost for the last 15 years, although many other Ural cherry varieties have failed to survive.

286. SAVAGE, E. F. and
COWART, F. F. 634.25:581.149
Factors affecting peach tree longevity in Georgia.
Bull. Ga Exp. Sta. 1942 : No. 219 : Pp. 15.
The authors point out that longevity of peach trees is, in part, a varietal character.

287. WEINBERGER, J. H., MARTH, P. C. and SCOTT, D. H. 634.25–2.6–1.521.6:575.11
Inheritance study of root knot nematode resistance in certain peach varieties.
Proc. Amer. Soc. Hort. Sci. 1943 : **42** : 321–25.
The following peach varieties are resistant to root knot nematode (*Heterodera marioni*): P.I.55775, P.I.55886, P.I. 55888 (all of the Yunnan group), P.I.63850 (Shalil) and Bokhara. Slight infection was recorded for P.I.55776, P.I.55885 (both members of the Yunnan group), P.I.63852 (Shalil) and P.I.61302 (a cross of Bolivian Cling x Quetta nectarine). Considerable resistance has also been found in some of the progeny of the Mao Tao group, viz. hairy peach, P.I.107838.
Crossing with susceptible varieties has demonstrated that resistance is a dominant character and is inherited through either male or female parent.

288. KRUG, C. A. 634.3:576.312.35:582
Chromosome numbers in the subfamily Aurantioideae with special reference to the genus *Citrus*.
Bot. Gaz. 1943 : **104** : 602–11.
In this study of the cytology of the Aurantioideae, the author tabulates the available literature relating to chromosome numbers and adds further information from his own investigations. For all the forms so far examined, the basic chromosome number is 9. About 40 triploids, 190 tetraploids, 1 pentaploid, 1 hexaploid and 14 or 15 aneuploids have been reported. In view of the constancy of the basic number and the ease with which intergeneric crosses can be made between *Citrus*, *Fortunella* and *Poncirus*, it is suggested that these three genera might be lumped.

289. CONDIT, I. J. 634.37:582:575.12
The fig-variety character, flattened neck.
Proc. Amer. Soc. Hort. Sci. 1943 : **42** : 255–58.
The flattened neck of some fig fruits is regarded as an important varietal character. When crossed with types having unflattened necks, the character behaves as a dominant and is transmitted to about 80–90% of the F_1 progeny.

290. HORN, C. L. 634.411:581.481
The frequency of polyembryony in twenty varieties of mango.
Proc. Amer. Soc. Hort. Sci. 1943 : **42** : 318–20.
The frequency of polyembryony has been estimated for 20 varieties of mango. This character either indicates complete apomictic reproduction from nucellar tissue or it may arise from one fertilized ovum accompanied by nucellar apomicts.

NUTS 634.5

291. HANSEN, E. 634.51:577.16
Ascorbic acid content of walnut hulls.
Proc. Amer. Soc. Hort. Sci. 1943 : **42** : 265–66.
The ascorbic acid content of the hulls of the following species has been determined: *Juglans nigra*, *J. californica* var. *Hindsii*, and *J. regia* (5 varieties).

292. GRAVES, A. H. 634.53–2.421.9–1.521.6:575.127.2
Reports on research for 1940. Chestnut breeding work in 1940.
Brooklyn Bot. Gdn Rec. 1941 : **30** : 87–93.
Hybrids of Japanese and American chestnuts are only slightly more resistant to *Endothia parasitica* than the American forms. The crosses resemble the latter, however, in their upright habit while their growth rate is quicker. These hybrids have been crossed to disease resistant Chinese types but the offspring are too young at present to report on disease susceptibility.
A collection has now been made of all the known species of *Castanea* excepting three Asiatic types. Most species of the collection are susceptible to *Endothia*.

293. Graves, A. H. 634.53–2.421.9–1.521.6:575.127.2
Reports on research for 1941 : Chestnut breeding work in 1941.
Brooklyn Bot. Gdn Rec. 1942 : **31** : 94–99.
Sexual precocity has been observed in some of the heterotic offspring of *Castanea crenata* x *C. dentata*. It is becoming evident that *C. dentata* is dominant with regard to growth habit and incompletely dominant with respect to disease susceptibility. A considerable number of F_2 hybrids have been reared successfully.

294. Stone, C. L., Jones, L. E. and Whitehouse, W. E. 634.574:581.331.2:578.08
Longevity of pistache pollen under various conditions of storage.
Proc. Amer. Soc. Hort. Sci. 1943 : **42** : 305–14.
Investigations on pollen longevity are described for the following species: *Pistacia vera, P. atlantica, P. chinensis, P. integerrima* and *P. Terebinthus*. Generally speaking, it was found that germination tests *in vitro* were a reliable index of actual fertilizing power.

295. Harvey, P. H. and Schultz, E. F. (jun.) 634.58:581.165.72:575.12:578.08
Multiplying peanut hybrids by vegetative propagation.
J. Amer. Soc. Agron. 1943 : **35** : 637–39.
The authors demonstrate that hybrid peanuts may be multiplied by cuttings, thus facilitating studies on heterosis and increasing the total yield of seed.

OTHER FRUITS 634.6

296. Bailey, L. H. 634.6:582:001.4
Studies in palms. 4. Brahea, and one Erythea. 5. New palms in Panama, and others.
Gentes Herbarum, N.Y. 1943 : **6** : 177–264.
Several new species and one new genus of palm are described from Panama.

297. McVaugh, R. 634.651:577.8:575
To make tough meat tender.
Agric. Amer. 1943 : **3** : 134–36.
Efforts are being made to breed pistillate and bisexual races of papaya.

298. Stambaugh, S. U. 634.651–2.4–1.521.6:575.12(75.9)
Disease resistant papaya will aid industry.
Florida Gr. 1941 : **49** : No. 9 : p. 5.
A female mutant of Blue Solo, distinguished from the normal type by morphological differences and resistance to leaf spot, has been used for breeding improved lines of papaya combining high quality fruit with leaf spot resistance. Susceptibility to this disease is one of the principal causes of winter damage.

299. Bologovskaja, R. P. 634.7:575(47)
(Breeding small fruits in Siberia and the Far East).
Plodovo-Jagodnye Kul'tury (Fruit Crops) 1940 : No. 4 : 64–68.
The main problem in breeding small fruits for these areas is the same: to produce varieties combining high quality and yield with extreme winter-hardiness.
The wild Siberian currant has larger berries than the European blackcurrant varieties and is very much hardier. Some of them contain up to 200 mg. vitamin C per 100 grm. and yield 5–6 kg. of fruit per bush. By careful selection among seedlings of these Siberian currants eight improved varieties have been produced.
For red currant breeding two wild species are of interest, *Ribes Palczewskii* for its extremely early ripening and large berries of excellent flavour, and *R. manshuricum* for its late ripening and tolerance. *R. atropurpureum* and *R. altissimum* are of interest for their hardiness, resistance to anthracnose, robust growth and large acid fruits. All these species are promising for hybridization.

The gooseberries most suitable as pollinators are the variety Houghton and the American species *Grossularia hirtella*, *G. Cynosbati* and *G. divaricata*. For particularly rigorous conditions of climate, selection among the seedlings of *G. acicularis* is recommended, as that is the hardiest species known. A great variety of forms of the species is to be found in the Altai mountains, varying in yield, size of fruits, spine development and resistance to *Sphaerotheca*. The wild species of the Far Eastern provinces, *G. burjense*, is also considered promising as a parent, being resistant to mildew and frost.

Raspberry breeding can most successfully be based on selection from the local forms of *Rubus Idaeus* subspecies *vulgatus* Arrhen. rather than the Siberian subspecies *melanolasius* F., followed later by crossing with the European cultivated forms.

The production of good hardy strawberries is difficult because *Fragaria vesca* and *F. elatior*, when crossed with the cultivated strawberry, give matroclinous hybrids and the American species *F. platypetala* and *F. chiloensis* are not available. Attempts are to be made to cross with *F. orientalis* Los.

300. Bologovskaja, R. P. 634.711:575(47)
(The raspberry "Kuz'min's Novelty").
Plodovo-Jagodnye Kul'tury (Fruit Crops) 1940 : No. 5 : 73–74.

This variety, which is one of the most frost-resistant raspberries known and is much cultivated in Siberia, was raised at the end of the 19th century by N. V. Kuz'min. Its exact parentage is not known. The fruits ripen early in the year, are large, abundant and of good quality, with a ratio of sugar to acid of 6·67 : 1. The plant, which is described as partially autumn-bearing, is completely free from all the diseases and pests that affect most raspberries in Siberia.

301. Slate, G. L. 634.711:575.12(73)
"Milton"—a new red raspberry.
Fm Res. N.Y. St. Sta. 1942 : **8** : No. 4 : 7, 9. [From Exp. Sta. Rec. 1943 : **88** : p. 196].

The new American raspberry described was obtained from a cross between Lloyd George and Newburgh. It is being introduced as a probably mosaic-free late variety for commercial and home use.

302. Fischer, H. E.,
Darrow, G. M. and
Perlmutter, F. 634.711:576.356.5:581.04
Raspberry and blackberry breeding: production of tetraploid raspberries.
Proc. Amer. Soc. Hort. Sci. 1943 : **42** : 447–56.

Polyploids have been obtained by the colchicine technique from the following plants: (*Rubus Idaeus* x *R. strigosus*) x *R. parvifolius*, (Potomac x Latham) x Taylor, *R. occidentalis* x *R. Idaeus*, (Lloyd George x Ranere) x Pynes Royal, Latham x Red Cross, and Cumberland black raspberry. The polyploids are compared to the diploids with regard to morphological characters, disease resistance, physiology and fertility.

303. Roberts, O. C. and
Colby, A. S. 634.711:582:578.088
Identification of certain red and purple raspberry varieties by means of primocanes.
Proc. Amer. Soc. Hort. Sci. 1943 : **42** : 457–62.

The following characters have been found useful in the identification of raspberry varieties in the vegetative condition: prickle morphology, cane colour, amount of bloom on the cane, degree of pubescence on the cane, shape of primary leaves, number of leaflets, leaf folding, leaf rugosity, leaf margin, petiolar pubescence and armature, and leaf habit.

304. Bailey, L. H. 634.715:582(7)
Species Batorum. The genus *Rubus* in North America. VI. *Cuneifolii*.
Gentes Herbarum N.Y. 1943 : **5** : 425–61.

A contribution to the taxonomy of the genus *Rubus*, section *Cuneifolii*, is presented. Several new species and varieties are described. (Cf. "Plant Breeding Abstracts", Vol. XIII, Abst. 946).

305. HUNTER, A. W. S. and
DAVIS, M. B. 634.723–2.4–1.521.6:575.11
Breeding rust resistant black currants.
Proc. Amer. Soc. Hort. Sci. 1943 : **42** : 467–68.
A rust resistant plant of *Ribes ussuriense* has been crossed with Boskoop Giant and Kerry. Resistance is inherited as a dominant factor. Several plants, tentatively identified as *R. aureum* and *R. odoratum*, have a slight degree of resistance. The segregates obtained from *R. ussuriense* crosses differ in their susceptibility to *Sphaerotheca mors-uvae*, resistance to which appears to be inherited independently of rust resistance.

306. MORROW, E. B. 634.73:581.162.32
Some effects of cross-pollination versus self-pollination in the cultivated blueberry.
Proc. Amer. Soc. Hort. Sci. 1943 : **42** : 469–72.
Cross-pollination of blueberry varieties increases the percentage fruit set and the fruit size and leads to earlier ripening. No differences in the weights of fully developed seeds were observed between cross-pollinated and self-pollinated plants.

307. OVERCASH, J. P.,
FISTER, L. A. and
DRAIN, B. D. 634.75:575.11
Strawberry breeding and the inheritance of certain characteristics.
Proc. Amer. Soc. Hort. Sci. 1943 : **42** : 435–40.
Information is tabulated on the inheritance of vegetative and fruit characters in strawberry crosses.

308. ČUEV, N. V. and
MATVEEV, V. P. 634.75:575.12:581.143.26.035.1:578.08
(Hybridization of strawberries under artificial light under the conditions of the Murman province).
Plodovo-Jagodnye Kul'tury (Fruit Crops) 1940 : No. 4 : 77–79.
Strawberry plants were grown during the arctic winter in a windowless room under artificial light. The variety Roščinskaja came into flower on 27th November, 1937, 18 days after being placed in the artificial light. The variety Saxonka flowered two days later and pollinations between the two were made on 30th November, pollination being repeated at intervals during the period of flowering. All twelve flowers pollinated set fruit, the first of which ripened on 23rd December. An average of 68 seeds per fruit was obtained. On 27th February, 1938, the seeds were sown, the seedlings being grown in the glasshouse until 22nd June, when they were planted out; they remained out of doors through the winter, and all but 5% survived. The hybrids showed various combinations of the parental characters.

309. LINEBERRY, R. A. and
BURKHART, L. 634.75–2.19–1.521.6
Nutrient deficiencies in the strawberry leaf and fruit.
Plant Physiol. 1943 : **18** : 324–33.
Conspicuous differences in potassium and calcium deficiency symptoms have been observed between the varieties Klondike and Blakemore.

310. KOBOZEV, V. V. 634.76–1.524(47)
(A cranberry with large berries from the Turuhan region).
Plodovo-Jagodnye Kul'tury (Fruit Crops) 1940 : No. 5 : p. 76.
Among the three main species of cranberry, *Oxycoccus macrocarpus*, *O. microcarpus*, and *O. palustris*, the first-mentioned, from America, is the most valuable because of its large berries; but none of its varieties can withstand the cold climate of those parts of the U.S.S.R. where cranberries should most conveniently be grown. Though *O. palustris* can grow beyond the Arctic Circle its berries have hitherto been considered too small, a shortcoming which is shared with the third species, the yield of which is also too small.
During the years 1936 to 1939, when cranberry bogs were being searched for new varieties by the Jarcevski station, some varieties of *O. palustris* were discovered which had larger fruit than

the normal. The dimensions of the berries of three varieties are given and compared with the normal. It therefore seems that the ordinary European cranberry includes many forms, the berries of some of which compare favourably in size with those of the American species. I. Z.

VITICULTURE 634.8

311. Olmo, H. P. and Rizzi, A. D. 634.835:575.061.6
Selection for fruit color in the Emperor grape.
Proc. Amer. Soc. Hort. Sci. 1943 : **42** : 395–400.

The causes of colour variation in the fruit of the Emperor grape have been investigated. In a few cases, seasonal variation was found but usually the differences observed could be attributed to individual variation. It is uncertain whether these differences are genetically determined. It is possible some of the types are infected with a virus. No evidence of any direct effect by the rootstock could be obtained.

312. Oberle, G. D. 634.835:575.127.2:575.11(73)
An evaluation of the use of French hybrid wine grapes in breeding hardy grapes for the eastern United States.
Proc. Amer. Soc. Hort. Sci. 1943 : **42** : 413–17.

The advantages to be expected from the use of European hybrid vines as parents in an American grape breeding programme are described. Crosses have been made between the following varieties: Seneca x Commandant, Seneca x Seibel 6339, Seibel 5437 x Seneca, Bertille Seyve 2667 x Seneca, Seibel 6905 x Elvira, Ontario x Seibel 6905, Commandant x Yates, Seibel 5898 x Fredonia, Seibel 6905 x Fredonia, Seibel 6905 x Kendaia, Seibel 4643 x Ontario and Brocton x Seibel 6905. Several promising lines have been produced. Information has also been collected on the genetics of hermaphroditism, fruit colour, teinturier types, winter hardiness and disease resistance.

313. Kuz'min, A. Ja. 634.835:575.3
(**Training vine seedlings**).
Plodovo-Jagodnye Kul'tury (Fruit Crops) 1940 : No. 5 : 46–52.

The earlier formed wood is phasically more mature than new wood and should not be removed by pruning or other measures, as these retard the seedling in coming into fruit. Great advantages are claimed for the method of laying the seedling vine, when it is three or four years old, in a trench and allowing only the top 3-4 buds to protrude above the soil. A mass of adventitious roots is formed and the exposed buds give rise to very strong healthy shoots which have yielded up to 62·5% more than untreated controls. By applying such treatment to the seedlings from a number of crosses, fruit formation has been induced in the third or fourth year as against the 5–8 years usually required. The best seedlings have been selected.

314. Olmo, H. P. 634.835:581.162.3:581.162.5
Pollination of the Almeria grape.
Proc. Amer. Soc. Hort. Sci. 1943 : **42** : 401–06.

Self-pollination in the Almeria grape is very rare, firstly owing to mechanical difficulties, and secondly, to a very high degree of self-sterility. The pollen could not be germinated *in vitro*. Both anemophilous and entomophilous cross-pollinations are effective.

315. Sousa, L. de G. M. da C. e. 634.835:581.162.52
Casos de sui produtividade nalgumas castas de uvas de mesa. (**Cases of self-fertility in certain varieties of dessert grapes**).
Rev. Agron. Lisboa 1942 : **30** : p. 446.

Fruits were obtained by selfing from the varieties Ferral branco, Moscatel da Madeira, Formosa, Rosaqui and Ohañez and by bagging emasculated flowers in the varieties Dattier de Beyrouth, Moscatel de Alexandria, Sultana, Sultanina à gros grains and Corinthe à gros grains. Morphological studies have established the identity of the varieties Alicante encarnado and Alicante de Málaga and of Sultana and Sultanina à gros grains.

316. Magoon, C. A. and Snyder, E. 634.835:581.9:575.3(73)
Grape regions of the United States.
Proc. Amer. Soc. Hort. Sci. 1943 : **42** : 425–31.

The authors have prepared a map of the U.S.A. showing nine regions, each characterized by suitability for certain grape varieties. A brief discussion of these regions follows.

317. 634.97:575(48.5)

*Skogsträdens förädling. (**Forest tree breeding**).
Skogen 1941 : **28** : 57–60, 81–83.

This article is a slightly abridged form of the report by Prof. Sylvén already reviewed in "Plant Breeding Abstracts", Vol. XIII, Abst. 1383.

318. †Sylvén, N. 634.97:575(48.5)

Riktlinjer och önskemål vid Svensk skogsträdsförädling. (**Lines of work and objectives in Swedish forest tree breeding**).
Svenska SkogsvFören. Tidskr. 1943 : **41** : 40–78.

This is a well documented record of the origins, development, present trend and economic organization of forest tree breeding in Sweden.
Many of these papers have already been reviewed in "Plant Breeding Abstracts".

319. Wettstein, W. von 634.972:575:581.6(43)

Züchtungsmöglichkeiten auf höheren Zellulosegehalt. (**Possibilities of breeding for higher cellulose content**).
Holz als Roh- und Werkstoff 1942 : **5** : 373–75.

Developments in the wood chemistry industry in Germany call for an increased output of timber which can be attained by selection of the best shaped types, hybridization, utilization of F_1 individuals exhibiting heterosis and cultural measures promoting increased growth. Quality must not, however, be neglected and fibre production must be accompanied by an output of cellulose in the purest possible state with the highest degree of polymerization, which means that the breeder must produce a tree combining a good annual growth increment with the maximum cellulose content possible. Staudinger suggests that the aim should be to breed for increased timber yield per hectare while selecting for high cellulose content. By his process he found a wide range of variation in the cellulose content of the various trees species; the black poplar (*Populus nigra*) having 50·3–51%. Previous determinations have recorded differences between individuals and among trees of different provenance belonging to the same species, but it is not yet known how far such differences may be due to environment or to heredity. In the larch and Norway spruce large differences were found depending on the altitude at which the trees were growing.
A small scale rapid and sufficiently accurate technique for determining the true content of pure cellulose presents various difficulties in view of the macromolecular structure of cellulose and the accompanying substances as well as the scanty knowledge available on the differences in the content and structure of the carbohydrates of different species of timber.
By analogy with results obtained in plant breeding it may be assumed that by hybridization and selection higher yields of timber can be combined with increased cellulose content, but it is essential to ascertain the size of variations due to modification and how far varietally conditioned differences may be increased.
An attempt was made to obtain an increased yield in poplars by taking advantage of their great capacity for regeneration and by adopting a rotation of only a few years duration, which incidentally requires much less space for the experimental trees.
Three different varieties of poplar hybrids were planted at 1 × 1 metres and 1 × 0·5 metres distance; a year later pole weights of 1160 kg./ha (at 1 × 1 m.) and 2740 kg./ha (at 1 × 0·5 m.) were recorded for the new hybrid 8/33, a *Populus angulata* cross, as compared with Garzin and Schönfliess hybrids for which the corresponding figures were respectively 390 and 1360 (at 1 × 1 m.) and 680 and 2320 (at 1 × 0·5 m.) respectively. Fifteen other hybrids tested at Müncheberg in small plots planted at 1 × 1 m. and 1 × 0·5 m. gave weights ranging from 1440 kg./ha. for the Harffer poplar to 4320 kg./ha for the *P. angulata* hybrid 279/29 and 5320 kg./ha. for the hybrid *P. Simonii* x *P. deltoides* 8/32[2].
A further experiment with 40 sib plants from a cross, made to assess regeneration capacity and vigour, showed that with the wide range of variation selection for growth found in later years would be effective. A process for determining cellulose content from small amounts would ensure improved yields both as regards quantity and quality. Hitherto in the absence of

* Abstractor's footnote: Stated in introduction to be a condensed form of still another article by N. Sylvén in Skandinaviska Bankers Kvartalsskrift.

† An abridged translation of this paper is on file at the Bureau.

such a small scale technique, basic research on increasing yield aimed at increasing the timber output per hectare.

The study of the races of different provenance, already found among various forest tree species, can now be begun with co-operation from the genetical, chemical and horticultural or agricultural side to identify the economically useful and useless forms.

As a source of cellulose and other industrial products, the value of the poplar could be still further increased by using new cultivated forms to obtain a quicker rotation. The questions then arise as to how far the regeneration capacity of young poplars that have been cut down once will ensure an annual increment and what rotation gives the best value. How greatly this characteristic varies is demonstrated by growth and increment tables for young poplars, showing that out of 15 sibs from a *Populus angulata* x *P. serotina* cross, no two are even approximately equal. Moreover the regeneration capacity when compared with the previous year's growth shows wide individual differences which are moreover by no means always in the same direction. Similarly the proportion of the well grown plants also varies. Selective breeding should be concentrated on all these features and also on rooting capacity. On this composite basis of selection, out of 10 superior types from the above cross, hybrids 39 and 36 would appear to be outstanding whilst Nos. 2, 33, 32, 25 and 7 could be graded as suitable for retesting.

320. Silva, A. R. P. da 634.972:581.47
Uma forma *Dolichocarpa* da azinheira. (**A *dolichocarpa* form in the holm oak**).
Rev. Agron. Lisboa 1942 : **30** : p. 462.

A single individual with elongated fruits not completely filled by the seed was found among a normal stand.

321. Palmer, E. J. 634.972.1:582:001.4
***Quercus Prinus* Linnaeus.**
Amer. Midl. Nat. 1943 : **29** : 783–84.

The author suggests that *Quercus Houstoniana* Muller is a synonym of *Q. Prinus* Linn.

322. 634.972.3(49.3)
Johnsson, H. 634.972.3:575(48.5)
Poppelkulturer—Intryck från en studieresa till Belgien och synpunkter på poppel i svenskt skogsbruk. (**Poplar plantations : impressions from a study tour to Belgium and views on the poplar in Swedish forestry**).
Svensk. PappTidn. 1943 : No. 9 : 208–14.

Various aspects of poplar cultivation are discussed.

Poplar breeding on a large scale is in progress at Ekebo and types suitable for the conditions of the country are expected to be produced relatively soon. Cultivation problems relating to soils, spacing and interplanting are included in the work of the Swedish Association for Forest Tree Breeding.

Though the aspen is the species preferred by the Swedish match industry, it could well be replaced by other forms of poplar in certain parts of the manufacture.

323. Walter, J. M.,
May, C. and
Collins, C. W. 634.972.8–2.421.9–1.521.6:575.12
Dutch elm disease and its control.
Circ. U.S. Dep. Agric. 1943 : No. 677 : Pp. 12.

Efforts are being made to cross lines of native American elms moderately resistant to *Ceratostomella Ulmi* with *Ulmus pumila*, the highly resistant Siberian elm. *U. pumila* var. *arborea* and *U. parvifolia* are both very resistant; Christine Buisman, a seedling selection of *U. carpinifolia*, is the most resistant variety raised in Holland, and it is possible that a moderate degree of resistance is possessed by *U. carpinifolia* forma *sarniensis* and *U. hollandica* var. *vegeta*.

324. McNair, J. B. 634.973:581.6:576.1:581.3
Some chemical properties of *Eucalyptus* in relation to their evolutionary status.
Madroño 1942 : **6** : 181–90.

The taxonomic distribution of the following major constituents of *Eucalyptus* oils has been

investigated: *d*–α–pinene, *l*–α–pinene, phellandrene, cineole, the aromadendral substances (cuminaldehyde, phellandral and cryptal), cymene, and piperitone.
"With progress in evolution the amount of the hydrocarbon (terpene), pinene and its oxidation product cineole increase to a maximum, then decrease; another hydrocarbon (terpene) phellandrene and its products form a second series of compounds which is evidenced first by the appearance of aromadendral . . . , next phellandrene becomes a pronounced constituent and finally its ketone piperitone increases in amount.
"The specific gravity increases with the increase in plant evolution, and the refractive index decreases with the increase in plant evolution, except where the oxygenated bodies decrease in amount with the increase in evolution".
These results are held to exemplify an instance of chemical ontogeny recapitulating phylogeny, for the successions recorded above are paralleled in the development of the young seedlings.

325. 634.975:576.16(49.4)
WETTSTEIN, W. von 634.975–2.42–1.521.6
Unterschiede bei Nachkommen von Alpenlärchen. (**Differences in the progeny of Alpine larches**).
Allg. Forst- u. Jagdztg. 1942 : **118** : 157–61.

Observations have shown that in the north German Plain the Sudeten and the Polish larches are superior to the Alpine larch in growth increment and resistance to disease, e.g. canker. The Sudeten larch, in contrast to the Alpine form, is much less affected by early and late frosts and is adapted to the climatic conditions of lowland plains. In an attempt to explain these differences a small scale study was made of the progeny of larches growing in different soils at different altitudes and on different aspects of the slopes of the Gschnitz valley in the northern Tyrol.
Both the dry matter content of the seed and the number of needles per seedling were found to vary with the environment and the results suggested that local races of larch probably exist. (See also Forestry Abstracts, Vol. IV, No. 2, p. 91).

326. ERDTMAN, H. 634.975:581.192:576.16
Die phenolischen Inhaltsstoffe des Kiefernkernholzes IV. (**The phenol constituents of heart wood of pine IV**).
Svensk PappTidn. 1943 : **46** : 226–28.

Mention is made of some results (to be published elsewhere) of analyses of the heart wood of *Pinus palustris, P. nigra, P. montana* and *P. Banksiana.*

327. ARNBORG, T. 634.975:582(48.5)
Busktallen. En inventering. (**The bush pine: A survey**).
Skogen 1941 : **28** : p. 174.

A description is given of the "bush" pine, the *Pinus silvestris* f. *condensata* described by Th. Fries (in Botaniska Notiser 1890) and its occurrence in Sweden and the author invites speedy co-operation in collecting records of its incidence, dimensions, etc., as it may possibly soon die out.
Another aberrant conifer form, the sparsely branched "worm-like" Norway spruce (ormgran), is also mentioned.

VEGETABLES 635

328. BACHER, T. 635:575:001.4(48)
Sektionen før Foraedlings- og Forsøgsvirksomhed med Haveplanter. Referat fra N.J.F.'s Havebrugssektions Møde i København, Fredag den 26. Februar 1942. (**The Section for Breeding and Research Work with Horticultural Plants. Report from the Scandinavian Agricultural Association's Meeting in Copenhagen. Friday 26 February 1942**).
Nord. JordbrForskn. 1942 : **24** : 7–10.

At the previous meeting of the Section a preliminary classification of cooking peas had been outlined but, as the number of varieties is increasing continually, a reduction in the synonyms and some of the actual varieties too would be highly desirable. The distinction between a strain and a variety was discussed by various speakers, and also the use of these designations and the term "type". In addition the difficulties of applying general criteria to the different species of vegetables and of classifying crops, such as cauliflowers, which include so many intermediate forms, were considered. A committee representing various interests was chosen

to study the problem. Further points raised included: the significance of the foreign trade of seed firms as a factor in the production of too many varieties, German state control of varieties and the possibility of the commercial importation of a new foreign variety under several names and the value of trials for identification purposes in such cases.

329. COULTER, F. C. 635.15:576.16
The story of garden vegetables. XVII: Radish, still going strong after thirty centuries of development.
Seed World 1943 : 53 : No. 8 : 10–11.

This account includes a discussion on the origin of the cultivated radish. It is suggested that two centres of origin are likely, one to the south of the Caucasus and the other in China. The connexion between *Raphanus raphanistrum* and *R. sativus* is obscure.

330. KRIVENKO, A. A. 635.25:575.127.2:635.26
(Interspecific hybridization in onions).
Vestnik Ovoščevodstvo i Kartofel' (Vegetable and Potato Journal) 1941 : No. 1 : 70–78.

After a brief outline of the existing knowledge of the genus *Allium*, a description is given of some of the species thought to be of use for breeding purposes, with information regarding their floral biology, methods used for retarding flowering in the wild species and the best time to perform hybridization.

A number of interspecific crosses have been made. The cultivated onion, *A. Cepa*, was invariably used as seed parent, a great number of different varieties being used. Seed was obtained from a number of crosses but the seed or seedlings were often inviable.

The greatest number of hybrids was obtained in the cross *A. Cepa* x *A. fistulosum*, the F_1 of which was partially fertile; it was also perennial and winter-hardy and resembled the spring onion more than the *A. Cepa* parent. The hybrid set no seed when pollinated with the parental or other species but gave a certain amount by open pollination. The F_2 hybrids showed remarkable diversity, some of them resembling neither of the parents, e.g. plants with 16 to 24 flowering stalks in the second year. Only about 6% of the F_2 formed bulbs. The F_2 hybrids were all sterile the first time they flowered but later formed flowers were partially fertile. The F_3 also contained a very low percentage of plants with bulbs, having been obtained from a bulbless F_2 plant. Some of the F_3 hybrids were fully fertile.

Selections were made among the bulbless F_3 plants, those with the best flavour and most healthy appearance being preserved. Some of these are being introduced into horticulture.

In the cross *A. Cepa* x *A. altaicum* the F_1 plants formed bulbs which survived the winter in the ground and flowered the following spring. All the hybrids obtained were sterile but the cross is to be repeated on a larger scale.

Hybrids of *A. Cepa* x *A. galanthum* also formed bulbs the first year; some flowered the next year but were sterile.

331. KOLOBERDINA, Z. I. 635.34:575.125
(The use of heterosis for increasing the yield of cabbage).
Vestnik Ovoščevodstvo i Kartofel' (Vegetable and Potato Journal) 1941 : No. 1 : 79–84.

Two cabbage varieties were sown together and allowed to open-pollinate, the seed from each being reaped separately. Different combinations of varieties gave different results, and the best showed increases of yield of up to 59%. The variety Braunschweig 423 was one of the components in 3 of the 4 best combinations. The best of all was Braunschweig 423 x Amager 658, in which the hybrid plants were distinguished by fine large heads ripening somewhat later than Braunschweig but earlier than Amager.

The next best combination was Braunschweig 423 x Amager 611, which yielded 53·7% more than the former parent and ripened earlier than either. The seed from the Amager parent gave rise to plants with higher yields, that from the Braunschweig parent to the plants that matured earliest.

The third best combination was Braunschweig 423 x Amager 1474, but the reciprocal showed no heterosis.

The fourth combination, Belorusskaja 455 x Amager 611, ripened earlier than Amager 611 when grown out of doors and hence gave a yield increase of 20–28%; when grown in frames the difference amounted only to 5–10%. The keeping quality of the hybrid heads was also very good.

332. Poole, C. F. 635.34:577.16:575
Vitamin C in cabbage.
Sth. Seedsman **1943** : **6** : No. 9 : 10, 47, 50.

Cabbage varieties have been selected for high vitamin C content and the best types inbred. A general tendency for the association of high ascorbic acid content with low yield has been found but careful selection can combine vitamin content with high yielding capacity. A strongly marked reduction in vegetative vigour has occurred after three seasons of inbreeding and this difficulty is being met by alternation of selfing with open-pollination.

333. Drewes, H. 635.41:575.42(73)
America takes over spinach seed production.
Sth. Seedsman **1943** : **6** : No. 8 : 9, 33, 41.

Some of the more important spinach varieties are described together with an account of breeding methods, in particular the selection from individual, hermaphrodite or monoecious plants.

334. Coulter, F. C. 635.41:576.16
The story of garden vegetables. XIX: Spinach—not one of the most ancient, but one of the most popular.
Seed World **1943** : **54** : No. 2 : 28, 57.

The cultivated spinach is believed to have arisen from *Spinacia tetrandra*, a plant native to the mountainous regions of Persia. A brief history of the more important varieties is given.

335. Berger, C. A. and
Witkus, E. R. 635.41:576.353:581.04
A cytological study of c-mitosis in the polysomatic plant *Spinacia oleracea*, with comparative observations on *Allium cepa*.
Bull. Torrey Bot. Cl. **1943** : **70** : 457–66.

The effect of colchicine on *S. oleracea* roots is described and the course of c-mitosis contrasted with that of *A. Cepa*. In the latter species, an achromatic sphere is formed around which the chromosomes aggregate at c-metaphase; it is believed that this is formed of incompletely organized spindle material and that it is the cause of the irregular shapes of the restitution nuclei. This structure is not found in *Spinacia* where the chromosomes form a dense clump at c-metaphase and spherical restitution nuclei. The reversion phase of *Spinacia* does not resemble anaphase or telophase configurations but goes through a condition similar to the prochromosome stage of insect spermatogenesis. Tetraploid cells are obtained from diploid somatic cells and octoploid from tetraploid.

336. Yamaguti, Y. 635.46:575.11:575–181.13:581.162.5
(A few abnormal characters in *Portulaca grandiflora*).
Jap. J. Genet. **1940** : **16** : 307–08.

A cross between a plant of *P. grandiflora* with very light yellow flowers and one with light pink revealed in the F_2 individuals with yellow-green leaves and plant body, a characteristic that behaved as a simple homozygous recessive to normal. The strain with this character is not very vigorous but completely fertile.

A type of fasciation appeared in the F_2 of a cross between a very light pink flowered type and a salmon flowered type. This anomaly too appeared to be conditioned by a single factor in the homozygous state. In plants with this character the anthers do not dehisce and the pistil is poorly developed, almost complete sterility being the result.

Another F_2 plant showing the same defects was observed in a cross of a yellow flowered plant with a plant with very light pink flowers. The stem was poorly developed and practically prostrate. Using this strain as the female, 100 crosses were attempted; two were successful and 2 seeds from them germinated, the resulting plants being of the normal type. Though there appear to be some features common to the author's sterile dwarf type and Okura's haploid dwarf, it is not yet possible to identify the strain under discussion as haploid. Whether segregation will take place after the F_2 remains to be seen; the author thinks fertility may occasionally appear in this strain owing to non-disjunction, as in Okura's case.

337. COULTER, F. C. 635.48:576.16
The story of garden vegetables. XVIII: Rhubarb—from a costly oriental drug to a popular pie.
Seed World 1943 : **53** : No. 11 : 10–11.
A general account of the origin and breeding of rhubarb is given.

338. THOMPSON, R. C. 635.52:575.11.061.6
Inheritance of seed color in *Lactuca sativa*.
J. Agric. Res. 1943 : **66** : 441–46.
The following bifactorial scheme is proposed to account for the inheritance of achene colour: *WWYY* for black achenes; *wwYY* for yellow, and *WWyy* and *wwyy* for white achenes.

339. DUSSEAU, A. and
MAGNANT, C. 635.52:576.312.35:576.356.5:581.04
Étude caryologique et dénombrement chromosomique chez une Phaséolée, *Voandzeia subterranea* Thouars. (**Cytological study and chromosome counts in one of the Phaseoleae, *Voandzeia subterranea* Thouars**).
C.R. Acad. Sci., Paris 1941 : **212** : 455–56.
The nuclear division in the cells of the root meristem of *V. subterranea* $n = 22$ has been studied briefly. This number is confirmed by the occurrence of tetraploid cells with 88 chromosomes after treatment with colchicine. R. M. I.

340. PANGALO, K. I. 635.61/3:581.162:576.16
(Sex and flowering in cultivated Cucurbitaceae).
J. Bot. U.R.S.S. 1943 : **28** : 10–23.
Examination of over 10,000 specimens in the world collection of cucurbits has shown that traces of hermaphroditism are to be found in the flowers of almost all the species. The various sex types found in the Cucurbitaceae are described. The greatest diversity of types is found in the genus *Cucumis*. The most primitive type, from which the others are thought to have evolved, is *Cucumis chinensis*, with androgenic hermaphrodite flowers. Forms with intermediate sex type have apparently been eliminated by natural selection in the wild species but are very common in the cultivated species.
Figures are given showing the degree of self-fertility in melons and water-melons from different countries. Hermaphrodite flowers of both species set seed quite well when bagged and pollinated with pollen from their own anthers.
A study of several thousand individuals revealed a correlation between sex type and shape of fruit in many of the species and in their hybrids. Many morphological features influencing the general habit of the plant are also correlated with the sex type. Experiments with various agencies that affect flowering have shown that the development of the male and female flowers is independent, one set of factors influencing the one and a different set influencing the other; short day for instance hastens the formation of female flowers but leaves the male flowers unaffected in *Cucumis, Citrullus* and *Luffa*, while in *Lagenaria* the female flowering is unaffected by length of day and male flowers hastened by long day. In *Cucurbita* different forms react differently, according to their place of origin.

341. RIOLLANO, A. 635.61–2.411.4–1.521.6(72.95)
Nueva variedad de melones para Puerto Rico. (**A new variety of melon for Puerto Rico**).
Agric. Exp. P.R. 1942 : **2** : No. 6 : 7–8.
Out of 22 melon varieties tested in Puerto Rico only 3 were sufficiently resistant to mildew to be suitable for cultivation. One of them, Rocky Dew, was found to be variable in regard to fruit size and shape, flavour and quality.
A new variety referred to as Smith's Perfect has been found which combines high mildew resistance with much greater yield than that of Rocky Dew, hitherto regarded as the best resistant variety. It is a selection from a melon originating in the Antilles and its fruit has exceedingly good quality.

342. TUL'ŽENKOVA, F. F. 635.615:582:578.088
(Identification of water-melon varieties in the laboratory).
Vestnik Ovoščevodstvo i Kartofel' (Vegetable and Potato Journal) 1940 : No. 5 : 56–61.
The varieties were classed according to colour of seed and after that according to seed shape,

size and weight and the colour of the hilum and the seed margin. In this way certain varieties could be definitely identified. For the rest it was necessary to examine 9 days old seedlings and record the degree of pubescence of the hypocotyl, its outline in cross-section, the number of vascular bundles and the size of the cotyledons. Differences were also revealed by treating the seeds with phenol or with a mixture of potassium bichromate with sulphuric acid in varying concentrations and by examining the fluorescence of seeds and rootlets under a quartz lamp.

343. Kobjakova, Ju. A. 635.63:575.12
(Alteration of varietal characters in cucumbers when open pollinated and when pollinated with a limited range of pollen parents).
Vestnik Ovoščevodstvo i Kartofel' (Vegetable and Potato Journal) 1941 : No. 1 : 85–87.

Seed was taken from cucumber varieties that had been allowed to open-pollinate in the midst of a number of other varieties. The plants produced from this seed, when compared with plants from "original" seed, proved to be more vigorous, earlier in maturity, bore larger fruits and had a longer fruit-bearing season. The open-pollinated progeny of plants with white pubescence all had white pubescence and all progenies maintained their varietal characteristics unchanged.

In 1940, eight different maternal varieties were allowed to open-pollinate in the vicinity of one pollinator, the variety Vjaznikovskii. Progeny from the combination Stepan Razin x Vjaznikovskii were better than either of the parents in quality and flavour of fruit, and were entirely free from bacterial attack. The progenies from certain other combinations were also promising as regards yield and resistance to bacterial disease.

344. Petrova, N. 635.63:581.47:575.061.6
(White fruited forms found among the Nerosimyi cucumber).
Vestnik Ovoščevodstvo i Kartofel' (Vegetable and Potato Journal) 1940 : No. 3 : 101–02.

The frequent occurrence of white fruits reduces the commercial quality of this otherwise popular variety. Observations were made on the progeny of a single plant, comprising 225 seedlings. No white fruits were observed in the parent plant or in the F_1 progeny but one family, Fam. 177, produced a number of white fruits in the second and third generations.

The progeny of one of the white fruited plants when open-pollinated contained seven plants with white fruits, one with pale green and 15 with dark green. Another white fruited plant was selfed and gave seedlings, all with white fruits, segregating for size of tubercles.

The plants bearing white fruits were in all other respects typical for the variety. Several other varieties are mentioned in which the same phenomenon has been observed.

345. Roque, A. 635.63–2.411.4–1.521.6(72.95)
El pepinillo "Puerto Rico No. 39". Nueva variedad de alta producción y resistente al mildeu. **(The cucumber Puerto Rico No. 39. A new variety of high yield and resistant to mildew).**
Agric. Exp. P.R. 1941 : No. 6 : 5–6.

A cucumber imported from China under the name Chinese Long has proved resistant to *Peronoplasmopara cubensis* but its fruit is of low quality. By crossing it with commercial varieties a new resistant variety, Puerto Rico 39, has been produced, which is mildew resistant, has fruit of marketable quality and far surpasses the common local variety Black Diamond in yield.

346. Alpat'ev, A. V. 635.64:575.12:575.148
(Intra-varietal crossing in tomatoes).
Vestnik Ovoščevodstvo i Kartofel' (Vegetable and Potato Journal) 1941 : No. 1 : 62–69.

Selection within the variety Earliana resulted in improvements in size and form of fruit, flavour and amount of flesh, and in a diminution in the number of seeds. Improvements of up to 20% in yield and increased disease resistance were also obtained. The author then went on to make intra-varietal crossings: plants of the variety Best of All were pollinated with a mixture of pollen from a number of different plants of the same variety. Similar pollinations were made in four other varieties. The tabulated results show that in almost all cases, an increased yield resulted, though in some the yield was unchanged; the plants

from crossed seed were more vigorous and healthy; they ripened either a day or two earlier or later than uncrossed controls or at the same time. In morphological characters the crossed plants were uniform and conformed to the variety in question. The yield differences varied in different years and sometimes amounted to 90%. The greatest increases were observed when the crosses were between plants of the same variety arising from seed grown in different localities and crosses between different plants of the same line were relatively less affected. However, the combination that gave the maximum effect one year sometimes showed little or no effect in certain other years. The succeeding generation also yielded more than the uncrossed but selected material, though the differences were not so large, being of the order of 19–30%; the effect disappeared entirely in the fifth generation but further increases were obtained when the crossed plants were further pollinated with pollen mixtures from the original variety.

The methods used in making the crosses are described. It is calculated that the increased yields well repay the cost of the labour involved.

347. BARRONS, K. C. 635.64:575.125

Spartan Hybrid—a first generation hybrid tomato for greenhouse production.

Proc. Amer. Soc. Hort. Sci. 1943 : **42** : 524–28.

The commercial possibilities of first generation tomato hybrids are discussed. Spartan Hybrid (Michigan State Forcing x Cooper's Special) yields up to 5·6 lbs per plant.

348. LINDSTROM, E. W. 635.64:576.356.5:575.242:581.162.5

Genetic stability of tomato diploids and tetraploids derived from haploid.

Proc. Iowa Acad. Sci. 1940 : **47** : p. 75.

Diploid tomato lines have been obtained by doubling the chromosome complement of a haploid line using the decapitation technique. Tetraploids were obtained in the similar way from the resultant diploids. Ten generations of severe selection in the diploid line produced no significant changes in two lines and a barely significant change in a third. Only one major point mutation was observed among 12,000 plants.

Selection during seven generations of the tetraploid was also without visible effect but the homozygous polyploid was highly sterile.

349. DOOLITTLE, S. P. 635.64–2–1.521.6

Tomato diseases.

Fmr's Bull. U.S. Dep. Agric. 1943 : No. 1934 : Pp. 83.

This bulletin mentions some of the more important cases in which varietal resistance to disease has been established.

350. ALEXANDER, L. J., LINCOLN, R. E. and WRIGHT, V. 635.64–2–1.521.6:575.12

A survey of the genus *Lycopersicon* for resistance to the important tomato diseases occurring in Ohio and Indiana.

Plant Dis. Rep. Suppl. 1942 : No. 136 : 51–85.

The Division of Plant Exploration and Introduction, Bureau of Plant Industry, United States Department of Agriculture, has made available 448 strains of *Lycopersicon* spp. which have been tested in Ohio and Indiana for resistance to the following diseases: wilt (*Fusarium bulbigenum* var. *Lycopersici*), leaf mould (*Cladosporium Fulvum*), leaf blights (*Septoria Lycopersici* and *Alternaria Solani*), ripe fruit rot (*Colletotrichum phomoides*), bacterial canker (*Phytomonas michiganensis*), bacterial spot (*Phytomonas vesicatoria*), bacterial wilt (*Phytomonas Solanacearum*), and tobacco mosaic virus.

L. peruvianum is uniformly resistant to tobacco mosaic and leaf mould. Some strains are resistant to *Fusarium*, *Septoria*, *Alternaria* and bacterial spot. Although this species is difficult to hybridize, fertile hybrids have been obtained from *L. peruvianum* x *L. pimpinellifolium* and from crosses with domestic varieties.

L. hirsutum has a high degree of resistance to defoliation diseases and tobacco mosaic. The variety *glabratum* is apparently resistant to red spider. This species has been hybridized without difficulty by crossing with *L. esculentum*.

No promising disease resistant lines have been obtained from *L. glandulosum.*
L. pimpinellifolium carries resistance to *Fusarium* and leaf mould, and some strains are resistant to *Septoria* and *Colletotrichum.* This species crosses readily with *L. esculentum.*
L. esculentum has provided little promising material. A few strains carry resistance to wilt and ripe fruit rot.
None of the species or strains considered above appears to carry any marked resistance to bacterial canker or bacterial wilt.

351. Alpat'ev, A. V. 635.64–2.111–1.521.6:575(47)
(Production of cold resistant tomatoes).
Vestnik Ovoščevodstvo i Kartofel' (Vegetable and Potato Journal) 1941 : No. 1 : 88–92.

Selections for frost resistance were made in the F_2, F_3 and F_4 generations of the following tomato crosses: Bison x Best of All, Bison x Štambovyi Alpate'eva (Alpate'ev's Standard), (F_6 Danish Export x Sparks) x Bison, (F_6 Danish Export x Sparks) x Determinate, (F_5 Michurin's Yellow x Bison) x Bison.
In this way a number of types were produced which produced more fruit and ripened earlier than the controls when grown out of doors. Yield increases varying from 38% to 76% were observed and the fruits on the hybrids were regular and of high quality. The form that showed the greatest tolerance to autumn frosts was an F_3 of the cross (F_5 Michurin's Yellow x Bison) x Bison, which bore smooth round fruits, which ripen well in storage, with a medium number of locules. Some of the most promising hybrids will soon be released for variety testing.

352. Tucker, C. M. 635.64–2.484–1.521.6:575.113
The development of wilt resistant tomatoes.
Proc. Mo. Acad. Sci. 1942 : **7** : 90–91.

Accession 160, a strain of *L. pimpinellifolium,* has remained practically immune to *Fusarium* wilt for seven seasons. Resistance is determined by a single gene and can be transferred without difficulty to commercial tomato varieties.

353. Holmes, F. O. 635.64–2.8–1.521.6:575.12
A tendency to escape tobacco-mosaic disease in derivatives from a hybrid tomato.
Phytopathology 1943 : **33** : 691–97.

A tendency to escape infection by tobacco mosaic has been demonstrated in the species *L. chilense.* This character must be distinguished from symptomless infection for, if the plants are once infected, they display all the normal effects of the disease. The character is, to some extent, genetic and its mode of inheritance when crossed to *L. esculentum* is being investigated.

354. Anderson, M. E. 635.65:575.12(73)
Breeding for post-war years. A look into the future at the type of peas and beans we will grow.
Seed World 1943 : **53** : No. 12 : 45, 48.

Recent developments in pea and bean breeding are reviewed. It is hoped that an improved variety of bush lima bean with green cotyledons and testa will be obtained shortly. Several runner bean hybridizations have been made between the varieties New Stringless Greenpod, Refugee, Blue Lakes and Stringless Black Valentine; the object of these crosses is to produce a bean with dark green pods for the eastern bean growing areas of the U.S.A. Marked improvement in wax bean varieties is recorded and much progress has been made in breeding peas resistant to *Fusarium.* New strains of the Thomas Lacton pea have been produced which differ from the original in having slightly smaller peas, increased hardiness, higher yields, and greater wilt resistance. Improved varieties of canning pea are also reported.

355. Lebedeff, G. A. and
Adsuar, J. 635.652:575(72.95)
Mejoramiento de las habichuelas en Puerto Rico. **(Improvement of beans in Puerto Rico).**
Agric. Exp. P.R. 1941 : **1** : No. 6 : p. 3.

Selections of both white and pink seeded beans which yield more than the standard varieties have been obtained by selection.

356. 635.652–2.7–1.521.6:575.127.2
STRAND, A. B. 635.652:575.061.6
Species crosses in the genus *Phaseolus*.
Proc. Amer. Soc. Hort. Sci. 1943 : **42** : 569–73.
Interspecific hybridization between *P. vulgaris* and *P. mungo* has been effected. It was found that the resistance of the latter species to the Mexican bean beetle acts as a recessive character. Preliminary experiments on the inheritance of testa colour are also reported.

357. MAGRUDER, R. and
WESTER, R. E. 635.653:575.12:581.162.32
Natural crossing of lima beans in Maryland during 1941.
Proc. Amer. Soc. Hort. Sci. 1943 : **42** : 557–61.
A considerable amount of hybridization occurs when lima bean varieties are grown together in the same field. The degree of this crossing depends both on the variety and on the individual plants.

358. HAWTHORNE, P. L. 635.654–2–1.521.6:575.12
The breeding and improvement of edible cowpeas.
Proc. Amer. Soc. Hort. Sci. 1943 : **42** : 562–64.
Two of the most serious diseases of cowpea crops are caused by root knot nematodes and *Fusarium* sp. respectively. These diseases may be avoided by breeding for early maturity or by breeding directly for resistance. The cross Iron Clay x Lady Cross produced high yielding, disease resistant offspring. A 3 : 1 ratio of resistant to susceptible plants was observed in the F_2.

359. GOBS-SONNENSCHEIN, C. 635.655:576.356.5:581.07
Die experimentelle Erzeugung polyploider Sojabohnen mit Alkaloidgemischen in Verbindung mit Kreuzungen polyploider Rassen. (**The experimental production of polyploid soyabeans with mixtures of alkaloids in combination with crosses between polyploid races**).
Züchter 1943 : **15** : 62–68.
In continuation of work already reviewed (see "Plant Breeding Abstracts", Vol. XII, Abst. 1229) soya bean plants were treated with such plant alkaloids as veratrine, atropine and nicotine instead of colchicine which was found to inhibit growth.
The effect of one alkaloid only on root tips or pollen mother cells was to produce the diploid chromosome number; with a mixture of two alkaloids, tetraploids and octoploids resulted in the F_1 and F_2.
Luxuriant growth, increased length, more flowers, size alteration in the stomata and more seeds per pod were shown by the parent plant treated with alkaloid. A table of the number of flowers from treated seeds showed an average of 65 flowers with atropine and 60 with colchicine as compared with 28 in the untreated plant. The polyploid plants also bloomed 8–14 days earlier than the normal plants. Details are given of the microscopic examination of the polyploid cells. The crosses between plants treated with one or other of the alkaloids or with normal plants resulted in diploid progeny if the cross was between treated and untreated plants or tetraploids if both parents were treated. R. M. I.

360. BURKHOLDER, P. R. 635.655:577.16
Vitamins in edible soybeans.
Science 1943 : **98** : 188–90.
Six varieties of soya bean have been analysed for ascorbic acid, thiamine, riboflavin, pyridoxine, biotin, niacin and pantothen.

361. PROBST, A. H. 635.655–1.421
Border effect in soybean nursery plots.
J. Amer. Soc. Agron. 1943 : **35** : 662–66.
A marked border effect has been observed in soya bean plots. The size of the effect depends on the variety used.

362. TERVET, I. W. 635.655–2–1.521.6
Soybean diseases in Minnesota.
Plant Dis. Rep. 1943 : **27** : 135–38.
The susceptibility of soya bean varieties to mosaic, mottle leaf, bacterial blight and a few other diseases, has been investigated.

BOOK REVIEWS

MALISOFF, W. M. 030.8:581.192

Dictionary of biochemistry and related subjects.

Philosophical Library, Inc., New York 1943 : $7.50. Pp. 579.

In the preface of this dictionary of biochemistry, the Editor-in-chief points out that in the U.S.A. the concept of a "dictionary" has been changing from that of a mere alphabetical glossary to something resembling an encyclopedia. He says that at the planning of this volume, there were such divergences of opinion amongst those responsible that the only thing left to do was "to try to reconcile seeming contradictions and to combine as many features as possible". The result of this compromise is a dictionary containing much glossary material interspersed with authoritative articles by leading biochemists on the more important topics. Picking at random an article on "Carbohydrate and Fat Catabolism and their Reciprocal Integration", one finds a note to the effect that this article is supplementary to a longer one in "Advances in Enzymology". Thus, the "dictionary" has been made to function in some respect as a journal of biochemistry, and must be expected soon to lose its original authority in this direction. On the other hand, the volume is particularly rich in information on the specific spot tests and empirical quantitative tests which take a prominent place particularly in clinical biochemistry. But it is to be regretted that, while space could be found for words such as Chrysalis, Ovary and Whiskey, structural formulae for even such important compounds as the purines, sterols and porphyrins are omitted. Many of the tables, too, are in such small print as to be difficult to read.

The task of producing, in one volume, a "dictionary" which is at once glossary and encyclopedia of one of the most all embracing of the sciences is indeed very great, and a step towards its accomplishment has been made. However, the value of this dictionary to workers in the scientific field lies mostly in its capacity as a book of ready reference, and it is unfortunate that it was not planned more consistently to this end.

Judging by wartime standards, the binding and general appearance of the book are tolerably good.

P. D. M.

PEARSON, E. S. and
WISHART, J. (Editors) 519·24

"Student's" collected papers.

Biometrika Office, University College, London 1942: 15s. Pp. xiv + 224. tables. figs. graphs. diagrams.

"Student" was the Faraday of modern statistical methods. An amateur mathematician, he was led to statistics by the nature of his work at Messrs Guinness; by a purely disinterested love of the subject and shear clear-headedness he ultimately became a pre-eminent statistician. A foreword by Lance McMullen gives an interesting account of "Student's" career. A scholar of Winchester and New College, Oxford, he obtained First Classes in Mathematical Moderations and in Natural Science. In the autumn of 1899 he went as a brewer to Messrs Guinness in Dublin. He finished his professional career by being Chief Brewer at Park Royal. For many years his scientific work had to be published anonymously; the first paper in which the anonymity was abandoned was one on co-operation in large scale experiments by *William Sealy Gosset* read to the Industrial and Agricultural Section of the Royal Statistical Society in 1936.

The following quotation from McMullen shows clearly why his statistical work developed as it did.

> "It is known that he could calculate a probable error in 1903. The circumstances of brewing work, with its variable material and susceptibility to temperature change and necessarily short series are all such as to show up most rapidly the limitations of large sample theory and emphazise the necessity for a correct method of testing small samples. It was thus no accident, but the circumstances of his work, that directed 'Student's' attention to this problem, and so led to the discovery of the distribution of the sample standard deviation, which gave rise to what in its modern form is known as the t test. For a long time after its discovery and publication the use of this test hardly spread outside Guinness's brewery, where it has been very extensively used ever since".

His papers can be divided into those concerned with mathematical statistical theory and those concerned with agricultural and genetical topics. In the former group the first three were all epoch-making. That on the error of counting with a haemacytometer was the first application in England of the Poisson distribution, that on the probable error of a mean led to the t test, that on the probable error of a correlation coefficient discovered the exact distribution of r in samples from a universe in which there is no correlation. The latter two papers are typical examples of "Student's" insight and clear-headedness which enabled him to obtain the first four moments of the required distributions. He then fitted Pearsonian curves and his intuition assured him that the results were exact. This was subsequently proved to be the case by R. A. Fisher. A later paper introduced the variate-difference method. Though this method was subsequently found to be disappointing in practice, the usual originality of the pioneer was manifest.

Of the agricultural and genetical papers, that on testing varieties of cereals was read to the Society of Biometricians and Mathematical Statisticians in May, 1923, when the reviewer had the privilege of being present. It introduced a statistical analysis of the famous half-drill strip method and gave the first reference to Fisher's analysis of variance. The paper on errors of routine analysis is relevant to the modern theory and practice of quality control, while that on the Lanarkshire milk experiment showed how an experiment planned on the grand scale, organised in a thoroughly business-like manner and devotedly carried out, failed to produce a conclusive result owing to an attempt to improve on a random selection of controls. Contributions to genetics are represented by two papers on Winter's selection experiment. We will quote once more from the foreword.

> "Student's" death at the comparatively early age of 61 was not only a heavy blow to his family and friends, but a great loss to statistics, as his mind retained its full vigour, and he would undoubtedly have continued to work for many years".

Nothing then could be more welcome than this beautifully produced and carefully edited collection of his papers. Prof. Pearson and Dr Wishart merit the gratitude of all those interested in statistics for this worthy memorial to a modest and charming personality who was also a great and inspiring man of science. J. O. I.

DOBZHANSKY, T. 576.1:575

Genetics and the origin of species.

Columbia University Press, New York 1941 : 2nd Ed. : $4.25. Pp. xviii + 446. 24 figs. 24 tables.

In the second edition, this book has been revised and enlarged to include recent advances in population genetics.

The original format (cf. "Plant Breeding Abstracts", Vol. XIII, p. 420) is largely retained though a penultimate chapter is inserted on patterns of evolution. Here a dynamic concept of evolutionary changes in cross-breeding organisms is developed from a consideration of the interaction of mutation pressure with selection and restrictions of population size. The special conditions created by polyploidy, self-fertilization, apogamy and asexual reproduction are also discussed.

A stimulating feature of the book is the emphasis placed by the author on certain unsolved problems in population genetics and related fields.

The omission of sub-headings to the chapter in the table of contents of the second edition seems an unnecessary sacrifice to the printer. K. S. D.

MUÑOZ, F. J. and
CHARIPPER, H. A. 578.6

The microscope and its use.

Chemical Publishing Co., Inc., Brooklyn, N.Y. 1943: $2.50. Pp. xii + 334. 122 figs. diagrams.

As the authors point out in their preface, there is room for a book on microscopes between the rather scanty instructions issued by makers and the thorough treatises full of optical theory. The present book will go far towards filling that need. The authors have wisely concentrated on giving useful information and have spared the reader accounts of the beauties of nature. The chapters of the book deal with the evolution of the microscope, the modern microscope, illumination, the microtome, the use and care of the microscope, stereoscopic, metallurgical and

polarizing microscopes, accessories and finally, common errors. The style of writing is quite colloquial, clear without being tedious. The book is well produced and illustrated and includes useful tables, diagrams, a glossary, a bibliography, a subject index and an index to illustrations.

This is a very useful book for anybody starting to use a microscope; being up to date it is worth reading by those who already have considerable experience, but the specialist will need to supplement it by wider reading. J. L. F.

ERNST, A. 581.466

Vererbung durch labile Gene. (**Inheritance by labile genes**).

Arch. Klaus-Stift. VererbForsch. **1942 : 17** : Pp. 567. 58 figs. 199 tables.

[Published by Art. Institut Orell Füssli A.-G., Druck und Verlag, Zürich.]

The author has spent 18 years in a study of the inheritance of calycanthemy, that is the transformation of the normal, green calyx into a second corolla. During the study, he found that the inheritance did not behave according to Mendel's law for monofactorial inheritance. Variations in the probable occurrence of calycanthemy were numerous and marked degrees of difference in the expression of the character were noted. Since 1931 it was realized that the varying expression of calycanthemy in individuals of the same origin was due, not to polymery or to multiple allelomorphs as was previously supposed but to mutational processes and that the gene for calycanthemy shows itself to be labile to a varying extent according to the different plasma in which it occurs.

The proof of this concept is followed in detail through numerous crosses in *Primula* species involving the inheritance of both heterostyly and calycanthemy. R. M. I.

AINSWORTH, G. C. and
BISBY, G. R. 632.4:030.8

A dictionary of the fungi.

Imperial Mycological Institute, Kew, Surrey **1943 : 20s.** Pp. viii + 359. 138 figs.

This book, written on the lines of Willis's "Dictionary of the Flowering Plants and Ferns", should prove of immense value both to student and research worker. In addition to generic names, synonyms, and the explanation of descriptive and technical terms, the authors have included many useful keys to the genera and families. Biographical notes on a few of the most important workers in the field of mycology are given, though one would have wished that more could have been included.

The authors claim that the book is written almost entirely in Basic English, though they admit that it does contain a certain number of non-Basic words. On the whole, the style does not suffer through this, though there are perhaps a few ambiguities. The rather ugly use of brackets in the second paragraph of the prologue to the reader, whether due to Basic English or not, is to be deprecated.

These, however, are only minor defects. If the book were for sale at about half the price indicated (20s.), its large amount of detailed information would make it the *vade mecum* of every mycologist. As it is, we doubt whether it will be seen and used by as many people as its high standard undoubtedly deserves. J. G. H.

CUNNINGHAM, J. C. 633.15:016

Maize bibliography for the years 1917 to 1936, inclusive.

Contra. Ia Corn Res. Inst., Ia Agric. Exp. Sta. **1941 : 2** : Pp. 364.

This bibliography has been designed to cover the literature on maize published between 1917 and 1936. Although no claim for completeness is made, especially in respect of Russian and Japanese papers, a full and comprehensive index of references is made available. Articles are grouped in order of subjects, while the entries under each sub-heading are arranged under the writers' names. An authors' index referring back to the subject index is given at the end.

Cross-references are cut down to a minimum by means of duplicated entries and it is possible that this procedure has led to a few omissions, for example, Demerec's paper on the "Inheritance of pale green seedlings in maize" is not found under the section "Genetics: Heritable Characters" although it is entered under "Chlorophyll", "Genetics: Hybrids and Inbreds" and "Genetics: Linkage". The arrangement of subjects is somewhat arbitrary, "Sap",

"Corn-hog programs" and "Corn-hog ratios" being dignified with separate sections while breeding, genetics, cytology, mutation and evolution are all relegated to sub-sections of "Genetics". The authors of joint papers are listed under each name in the second index but it would have improved this part of the book if the subject of the paper had been stated as has been done in the case of articles by single authors.

Taken as a whole, however, this volume should prove of considerable value to anyone wishing to study the literature relating to maize. The paper covers are a disadvantage but the printing and paper are good and the general appearance pleasing.

633.61:578.08:581.6
633.61:578.088

MOBERLY, G. S.

The cane testers' handbook.

Sugar Industry Central Board, Durban 1943 : 5s. Pp. viii + 85. Figs. 5 tables.

This handbook is designed for the use of cane testers who have, at the most, only a very elementary knowledge of laboratory procedure. The greater part of the book deals with methods of analysis and the arrangement adopted is both clear and pleasant to read. As the explanations are meant for readers without much scientific knowledge, the style is simple and occasionally benevolent.

A final section deals with the identification of common South African varieties, for which purpose a key has been constructed. Varietal descriptions have been set out well but the illustrating diagrams are rather scrappy and the continual use of "ligular process" for "ligule" is unnecessarily prolix.

633.88(94.4)

HURST, E.

The poison plants of New South Wales.

Poison Plants Committee of New South Wales, Sydney 1942 : Pp. xiv + 498. 23 tables. figs.

The Poison Plants Committee of New South Wales was set up in 1927, since when it has organized and co-ordinated work on poisonous plants.

The present work is a compendium of information on plants which have been reported as being poisonous to stock. The plants are listed in families, the usual order of families being followed. In all but the relatively unimportant species, botanical descriptions are given, together with information on distribution, general references, animals affected, symptoms, poisonous principles, etc. There is a short introduction of a general character, a bibliography, glossaries of botanical and medical terms and an index. Some of the species are illustrated by drawings.

J. L. F.

634

DYAL, S.

Tropical fruits.

Chemical Publishing Company, Inc., Brooklyn, N.Y. 1942 : $2.75. Pp. 257 + x. 11 figs. tables.

In this book, the author has attempted to combine in one volume all the knowledge necessary to plant an orchard, grow the fruit and dispose of it by canning and other means. In a book of two hundred and sixty pages of large type it has been impossible for the author to give much detail, with the result that most of it is very sketchy and would serve mainly to direct the reader to the larger standard works of reference. At times the author is not entirely accurate, as when he says that "lime may be present in the fertile soils in the hot or caustic form such as quicklime and hydroxide of lime". It is felt that there are better books on this subject already on the market.

C. M. D.

635.64:582

LUCKWILL, L. C.

The genus *Lycopersicon*. An historical, biological, and taxonomic survey of the wild and cultivated tomatoes.

Aberd. Univ. Stud. 1943 : No. 120. Pp. 44.

[Published by the University Press, Aberdeen, price 5s.]

This monograph can be recommended as a fine example of a detailed taxonomic and cytological study of a small group of plants. The genus *Lycopersicon* is of considerable importance both from theoretical and practical points of view and the author's treatment of his subject leaves little to be desired in the way of clarity and presentation.

After a short historical introduction, the morphology of the genus is described and the values of the various systematic characters, which include also such criteria as scent, photoperiodic reaction and chromosome configuration, are discussed. There is a pleasing reduction in the number of species, only seven being recognized as worthy of specific status. All of these are restricted in the wild state to the west coast of South America with the exception of *L. Cheesmanii*, which is endemic to the Galapagos islands. All thè species are described and figured in detail and their relationships discussed from the phylogenetic point of view. The genus is regarded as a comparatively recent offshoot of *Solanum*, its youth being indicated by the numerous morphological similarities between the species, the small area of distribution, the small number of species, and the absence of polyploid forms.

Occasional instances of careless sentence construction are a minor defect in an otherwise well-presented account. The explanation of the morphology of the extra-axillary inflorescence branches is also too cursory to be satisfactory, the whole question of the nature of the vegetative axis in the Solanaceae being a very difficult and complicated question. Finally, the author's concern at finding no biological advantage from the presence of raised stomata in the xerophytic species, *L. hirsutum* and *L. glandulosum*, seems to reflect an unduly teleological conception of adaptation.

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